EXHIBIT 44
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IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

IN RE: LENOVO ADWARE LITIGATION	Case No.: 5:15-md-02624-RMW **DECLARATION OF** **THOMAS R. VARNER, PH.D.**

1

I.   INTRODUCTION AND ASSIGNMENT

1.   I am an Executive Vice President in the Oakland office of the economic

consulting firm of Compass Lexecon.

2.   I received a B.S. in Architecture from California Polytechnic State University,

San Luis Obispo, California, in 1979, an M.S. in Civil Engineering (Structural Engineering and

Structural Mechanics) from the University of California at Berkeley in 1980, an M.B.A. from the

University of California at Berkeley in 1987, an M.S. in Engineering-Economic Systems from

Stanford University in 1993, and a Ph.D. in Engineering-Economic Systems & Operations

Research from Stanford University in 1997.

3.   I have taught microeconomics, econometrics, and financial economics courses in

the Economics Department at the University of California at Davis. I specialize in economic,

financial, and statistical analysis.

4.   For over ten years, I have served as a consulting or testifying expert on legal

matters, including intellectual property, class certification, and general business litigation. I also

have spoken at professional conferences and seminars on economic issues in litigation. I am a

member of the American Economics Association, the National Association of Business

Economics, and the Licensing Executives Society. My hourly rate is $585. My compensation

does not depend on the outcome of this litigation or on the opinions I express in this case.

5.   Details of my qualifications, including a list of my publications in the previous 10

years and a list of all other cases in which, during the previous four years, I have testified as an

expert at trial or by deposition, are in my curriculum vitae, attached as Appendix A.

6.   The *Consolidated Class Action Complaint*[1] ("the *Complaint*") makes certain

allegations regarding the inclusion of VisualDiscovery software on selected computers

manufactured by Lenovo[2] and sold to customers in the U.S. The *Complaint* alleges that

VisualDiscovery, a software product developed by Superfish (a software firm based in

California), "had a materially negative impact on Lenovo computer models on which it was

installed."[3] In particular, the *Complaint* alleges that VisualDiscovery adversely affected the

performance (increased CPU usage, increased power consumption, and decreased battery

performance),[4] security, and privacy of user information on the subject Lenovo computers.[5] The

Complaint claims that inclusion of VisualDiscovery on Lenovo's subject computers violated a

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[1] *Complaint*, filed 11/12/15.

[2] Lenovo (United States) Inc. is listed as a "Principal Subsidiary" of Lenovo Group Limited in its 2014/2015 Annual Report. For purposes of my declaration I refer to Lenovo (United States) Inc. as "Lenovo."

[3] *Complaint*, ¶ 5, p. 2.

[4] *Complaint*, ¶ 5, p. 2, "From a performance perspective, the program increased CPU usage, which increased power consumption. Because all of the computers on which it was installed were laptop computers that relied on a battery, the increased CPU usage decreased both the amount of time an affected computer could operate between charges and the lifespan of the battery. In addition, VisualDiscovery slowed the laptop's internet connections by up to 55 percent, caused certain web pages to load incorrectly and in many instances, blocked web pages entirely."

[5] *Complaint*, ¶ 6, p. 2, "In order to operate as intended, the program, without the user's knowledge or consent, broke the secure connection a user thought he or she was creating with an established website, rerouted that connection through a Superfish server and then sent results back to the user in a way that hid the fact that the search had been monitored, hijacked and altered. The process by which Superfish did all this relied on a single common digital key and weak password that were shared by all of the computers and easily accessible to a computer hacker, who could use them to access an affected computer on any public network and collect whatever information was being transmitted at the time."

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number of Federal and State statutes related to consumer fraud, wiretap, and electronic

communications privacy, among others.[6]

       7.   The *Plaintiffs' Motion for Class Certification* defines three "Proposed Classes"

(collectively the "Proposed Class Members"):[7]

> Direct Purchaser Class: All persons who purchased one or more Lenovo computer models, on which VisualDiscovery was installed, in the United States directly from Lenovo. (Represented by Mr. Richard Krause and Mr. Robert Ravencamp.)

> Indirect Purchaser Class: All persons who purchased one or more Lenovo computer models, on which VisualDiscovery was installed, in the United States from someone other than Lenovo. (Represented by Ms. Jessica Bennett and Mr. John Whittle.)

> California Class: All persons who purchased one or more Lenovo computer models, on which VisualDiscovery was installed, in California. (Represented by Ms. Jessica Bennett.)

       8.   The *Plaintiffs' Motion for Class Certification* does not define a class period. I

have been instructed by counsel for Lenovo to assume that the class period for all three Proposed

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[6] *Complaint*, pp. 36-40, Count I, Consumer Fraud and Abuse Act, 18 U.S.C. §1030; p. 40, Count II, Violation of the Electronic Communications Privacy Act, 18 U.S.C. §2512; pp. 41-42, Count III, Violations of the Wiretap Act, 18 U.S.C. §2510; pp. 42-44, Count IV, Violation of the California Unfair Competition Law, Cal. Bus. & Prof. Code §§ 17200; pp. 44-46, Count V, Violations of California's Consumer Legal Remedies Act, Cal. Civ. Code §§ 1750; pp. 46-47, Count VI, Violations of California's Computer Crime Law, Cal. Penal Code § 502; pp. 48-50, Count VII, Violations of California's Consumer Protection against California's Computer Spyware Act, Cal. Bus. & Prof. Code §§ 22947; pp. 50-51, Count VIII, Violations of California's Invasion of Privacy Act, Cal. Penal Code § 630; pp. 51-52, Count IX, Negligence under California Law; pp. 52-53, Count X, Trespass to Chattels under California Law; pp. 53-54, Count XI, Violation of Deceptive Acts and Practices Statute, N.Y. Gen. Bus. Law § 349; pp. 55-56, Count XII, Negligence under New York Law; pp. 56-57, Count XIII, Trespass to Chattels under New York Law.

[7] *Plaintiffs' Motion for Class Certification*, filed 7/22/16, p. vi. This pleading includes Ms. Rhonda Estrella as a representative of the Indirect Purchaser Class and the California Class. I understand from counsel that the Plaintiffs have subsequently withdrawn Ms. Estrella from the representative class. I refer to the remaining representatives of the Proposed Classes as "the Proposed Class Representatives."

Classes is from August 2014 to March 2015, the periods in which the subject Lenovo computers with VisualDiscovery preinstalled were shipped to the U.S.

9.   I have been retained by the Defendant, Lenovo, and have been asked by counsel for Lenovo, K&L Gates LLP, to evaluate the economic basis for class certification in this case. Specifically, I have been asked to evaluate from an economic perspective whether the alleged damages to the Proposed Class Members could be determined using facts and methods that are predominantly common to all members of the Proposed Classes. I have also been asked to review and reply to the *Expert Declaration of Bruce McFarlane*. Mr. McFarlane, an expert retained by the Plaintiffs, states in his declaration that his assignment was "to develop common methodologies to reliably measure the monetary harm Class Members suffered as a result of the [*sic*] Lenovo's alleged wrongful conduct." [8]

10.   In reaching my opinions, I reviewed the legal pleadings in this case, responses to interrogatories, documents produced by the parties, and publicly available materials; Appendix B lists the materials I have considered in rendering my opinions. I also have spoken with Dr. Sam Malek, Associate Professor in the Donald Bren School of Information and Computer Sciences at the University of California, Irvine. [9] My opinions are based on these materials and discussions, as well as my professional experience and expertise.

11.   This report reflects my opinions at the present time. I reserve the right to revise or supplement my report as additional documents, testimony, or information come to my attention. I also may respond to any additional opinions, if any, expressed or analyses performed by Plaintiffs' experts.

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[8] Expert Declaration of Bruce McFarlane, 7/22/16, ("McFarlane Declaration"), ¶ 8, p. 5.

[9] Phone interview with Dr. Sam Malek, 8/17/16 ("Sam Malek Interview").

II.   SUMMARY OF OPINIONS

12.   The Plaintiffs claim that the presence of VisualDiscovery adversely affected the performance of certain components and features as well as security and privacy issues of the subject Lenovo computers. Based on my analysis of the Proposed Class Representatives and other evidence in this matter I find that:

- There is virtually no evidence of actual adverse battery performance issues affecting the users' experiences due to the presence of VisualDiscovery on the subject Lenovo computers; consequently, there is no evidence of economic damages to the Proposed Class Members;

- There is minimal evidence of actual non-battery related performance issues affecting the users' experiences due to the presence of VisualDiscovery on the subject Lenovo computers; consequently, there is little evidence of economic damages to the Proposed Class Members; and

- There is no evidence of actual incidents of identity theft, computer hacking, software viruses, or other security or privacy issues due to the presence of VisualDiscovery on the Proposed Class Members' computers.

13.   The alleged losses attributed to VisualDiscovery among the Proposed Class Representatives, ranging from $0 to over $38,000, are specific to the individual Proposed Class Representatives and require individualized analysis; thus, there is no common methodology to calculate such damages.

14.   There is no evidence to support the Plaintiffs' claims that the presence of VisualDiscovery diminished the value of the subject Lenovo computers.

15.   The Proposed Class Representatives stated that they primarily use their Lenovo computers for business purposes; however, the subject Lenovo computers are marketed primarily to individual consumers, and it is these users who were expected to have an improved user experience from the inclusion of VisualDiscovery on their computers. Thus, the Proposed Class Representatives' user experiences are not typical of the Proposed Class Members' user experiences.

16.   I find that the damages methodologies proposed by the Plaintiffs' damages expert, Mr. Robert McFarlane, are deeply flawed, ignore basic economic principles, and are not tied to the facts in this case. In particular I find that Mr. McFarlane's:

- "Loss in Value" damages methodology's: (1) *assumption* that the subject Lenovo computers with VisualDiscovery have a "net negative value" is not supported by facts in this case; (2) accounting concept of book value depreciation, which is rooted in tax accounting standards, is not based on economic principles of market prices or value to individual users; (3) and *assumption* that the subject Lenovo computers installed with VisualDiscovery had $0 economic value but a positive economic value when VisualDiscovery was subsequently uninstalled contradicts basic economic principles of value;

- "Component Restitution" damages methodology: (1) only considers supposed demand factors and ignores supply factors, thus ignoring basic economic principles of supply and demand; and (2) *assumption* that the alleged performance, security, and privacy issues associated with VisualDiscovery is not supported evidence of actual economic harm to the Proposed Class Members;

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- Damages methodologies ignore the mitigating effects of Lenovo's offer to provide six months of free anti-virus software to purchasers of the subject Lenovo computers;

- Damages methodologies do not consider that the alleged security and privacy issues in this matter were only alleged potential risks and not based on actual incidents;

- Damages methodologies ignore the importance of individual circumstances of each Proposed Class Representative (and in fact never even mention any of the Proposed Class Representatives); and

- Damages methodologies rely on Mr. Gaskin's proposed survey results, which Dr. Ericksen shows to be flawed and misleading.

III.   BACKGROUND

A. Superfish and VisualDiscovery

17.   Presentation material from Superfish produced in this matter, dated 2014, states that Superfish was founded in 2006, it held multiple patents and consisted of a "multidisciplinary R&D team-including 7 PhD's."[10] This presentation material also stated that Superfish' shopping

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[10] Presentation titled, "Superfish.com, WindowShopper monetization platform," copyright date 2014, p. 2.

platform had 101 million monthly users.[11] An article in the *Silicon Valley Business Journal*

stated that Superfish had over $35 million in revenue in 2013.[12]

18.   I understand that the "shopping platform" described in Superfish's presentation

material was the basis for VisualDiscovery at issue in this litigation. This presentation material

describes Superfish's Window Shopper platform as incorporating "image recognition

technology" enabling "users to discover new deals and products" and as a "nonintrusive [user

experience design] enhancing the users shopping experience.[13]

19.   Presentation material from Superfish entitled "Lenovo See-More UX

Walkthrough," indicates that the application performs searches based on an image of a product.[14]

A one page "Superfish Overview" from Lenovo states, "when a user mouse-over a product

image during shopping experience, Superfish widget shows user similar products (with image)

available elsewhere providing the user more choices for better selections."[15]

20.   A presentation from Lenovo titled "Superfish" dated September 24, 2014 states

under the heading Main Function: "Superfish is as a shopping assistant application;" "The

application invokes when a user hits a shopping site and views a product image;" The user gets a

hover to click for comparison products & prices; "At first run the user can accept or reject and

disable the application;" "If they accept/keep it we get paid $.10;" "The user can disable the

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[11] Presentation titled, "Superfish.com, WindowShopper monetization platform," copyright date 2014, p. 7.

[12] "Superfish CEO's vision for visual search has changed the way we shop, search," Silicon Valley Business Journal, 11/23/14, http://upstart.bizjournals.com/entrepreneurs/hot-shots/2014/11/23/superfish-ceo-adi-pinhas-visual-search.html?page=all, accessed 8/6/16.

[13] Presentation titled, "Superfish.com, WindowShopper monetization platform," copyright date 2014, pp. 3 & 5.

[14] "Lenovo See-More UX Walkthrough," copyright date 2014, pp. 4 & 5.

[15] One page "Superfish Overview."

application after first run also by clicking on the hover;" "user can remove the application by using the standard add/remove program feature."[16]

B. Lenovo and Subject Lenovo Notebook Computers

> **i.   Lenovo**

21.   Lenovo's website currently states that it is the world's largest PC vendor.[17] Lenovo's current website shows that it manufacturers a number of computer products including laptops, tablets, workstations, and servers as well as storage and networking devices, accessories, and software. Just among Lenovo notebooks are listed over 25 different product series ranging from under $200 to over $1,000.[18] There is also a wide range of features a user can select for their individual computer related to the type of processor (Intel: Celeron, Xeon, Core M, i7, i5, i3; AMD), operating system (Windows 10 Pro/Home, Google Chrome), hard drive size (16 GB to 1 TB, and solid-state drive), memory (2 GB to 32 GB), and screen size (11 inch to 17 inch).

> **ii.   Lenovo and Superfish Business Partnership Agreement**

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[16] "Superfish," 9/24/14, Lenovo presentation, p. 2.

[17] http://www.lenovo.com/lenovo/us/en/our-company.shtml, accessed 5/27/16.

[18] http://shop.lenovo.com/us/en/laptops/?menu-id=laptops, accessed 8/6/16.

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████████████████████████   Although the Business Partnership Agreement between

Lenovo and Superfish included financial consideration, Mr. James Hunt, Distinguished Engineer

of Lenovo's software development group,[23] stated that Lenovo never received any payments

from Superfish (*i.e.,* Revenue Sharing, Slotting Fees, or any other form of payment).[24]

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[23] James Hunt Deposition, pp. 11-12.

[24] James Hunt Deposition, pp. 113-114, "Q. Was this deal structured so that it would be more profitable potentially for Lenovo than other software bundles? A. All deals are different, and honestly, in most of these deals where there's revenue share, that often ends up being nothing, so just depends on how successful that particular partner's solution is. In this deal, we got nothing."

CONFIDENTIAL

11

iii. Selection of VisualDiscovery for Subject Lenovo Notebook Computers

25.   An internal Lenovo presentation indicated that Lenovo was considering Superfish as of April 9, 2014.[25] Mr. Hunt stated that Lenovo checked to see if Superfish had a successful track record and that it was "TRUSTe certified."[26]

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27.   Mr. Hunt stated that the purpose of including VisualDiscovery in the subject Lenovo computers was to improve the users' experience and to save the user money by showing

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[25] "LBG Holiday Refresh Preload Proposal, 4/9/14, Exhibit 2 to James Hunt Deposition [LEN-0114943-951 at 51].

[26] James Hunt Deposition, p. 42, "A. Typically, our procurement organization will look to make sure that the company is, as stated, you know, a successful company in -- at their, at least some level of financial records." Pp. 44-45, "A. We asked the partner for Superfish for clarification, and they stated that they were TRUSTe certified and that was a third-party group that…certified that this was not malware or spyware.... Q. …So essentially if TRUSTe certified, does that come with an ostensible assurance of the company's product line? A. That was how we took it, yes."

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12

where online items could be purchased for less. [29, 30, 31] Mr. Hunt also stated that Lenovo

preinstalled other software on Lenovo computers, including McAfee antivirus software [32] and

Google Music,[33] to improve the users' experience. An internal Lenovo email stated that the goal

of including VisualDiscovery in Lenovo computers was to "enhance the shopping experience" of

the computer user.[34]

28.   Mr. Feng Lee, a senior manager with Lenovo and the primary liaison between

Lenovo and Superfish, stated that he "used VisualDiscovery extensively in order to evaluate it,"

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[29] James Hunt Deposition, pp. 109-110, "Q. So the philosophy underpinning this…business relationship was, in your estimation, that this would improve the user experience, the rev share deal is whatever it will be, but this may drive future consumers to our consumer notebook models because of this added feature? A. Right…there are many features in PCs and…the goal of that adding those features is that the user's happy with their experience, and the more happy they are with their experience, the more likely they are to recommend to others or to continue to purchase."

[30] James Hunt Deposition, p. 36, "Q. Could you describe for me what the Superfish-style experience would be so that I can then ask a follow-up question? A. Sure. The intent was that if the user was looking at something that also had a picture with it, so for example, I might have been searching for shoes. If I hovered over the picture of the shoe, it would show me the same shoe available in many different shopping locations. So it might be on Amazon, it might be on eBay, it may be on Best Buy. It might be on any number of sites. And the idea was that you could find the same shoe potentially for less money."

[31] James Hunt Deposition, p. 108, "A. We also felt like it was a good shopping experience for the end user and so… if I want to buy a television or a radio or a, you know, iPod or whatever, wouldn't I want to save some money, sure. And so that was kind of the intent was, we can provide something that helps the user have a better experience and potentially save money and at the same time, we can get some recovery of funds from the company." P. 109, "[I]f I hover over the picture of the iPod, it will show me other pictures of iPods at other sites and show me the price so I can immediately say it's $79 here and it's $59 here, why wouldn't I go over here and buy it."

[32] James Hunt Deposition, pp. 27-28.

[33] James Hunt Deposition, p. 31.

[34] Email from Peter Gaucher, Executive Director, Software & Content Services, Lenovo, Subject: "RE: Adware Program preloaded in Yoga 2 Pro," This is an app that is designed specifically to enhance the shopping experience when the user clicks on specific shopping web sites & shows images of alternative products & prices and it was approved by the Product and UX teams." Exhibit 24 to James Hunt Deposition. [LEN-0019129-134 at 132].

he "believed that the VisualDiscovery software was very useful as a shopping assistant," and that

he "received positive feedback from many people who used the program."[35] Mr. Lee stated that

"VisualDiscovery only functioned when a user's mouse hovered over a product image on pre-

determined shopping websites."[36]

iv.   Shipments of Subject Lenovo Notebook Computers

29.   Exhibit 1 is a summary of shipments of the subject Lenovo computers by model

and by month. (The *Complaint* lists 43 different computer models sold by Lenovo that allegedly

contain the VisualDiscovery software; however, Lenovo documents show that only 28 of these

models were sold in the U.S.[37]) Exhibit 1 shows that among the subject Lenovo computers

approximately 36 percent were Yoga tables, approximately 32 percent were G-series laptop

computers (described on Lenovo website as "Affordable Everyday Laptops"), approximately 14

percent were Y- and Z-series "gaming" and "multimedia" laptop computers, approximately 14

percent were dual mode (Flex-series) IdeaPads, approximately 3 percent were ultrathin IdeaPads,

and approximately 1 percent were Miix-Series convertible tablets.[38]

30.   Exhibit 2 shows that there were 796,443 subject Lenovo products installed with

VisualDiscovery shipped to the U.S. from September 2014 (Exhibit 2 excludes 716 computers

shipped to parties listed as "Lenovo" entities). Exhibit 2 show that there were over 120,000

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[35] Declaration of Feng Lee, 8/15/16 ("Lee Declaration"), pp. 1-2.

[36] Lee Declaration, pp. 1-2, "VisualDiscovery only functioned when a user's mouse hovered over a product image on pre-determined shopping websites. The list of those sites was built into the program. If you visited a non-shopping website that was not on the list, VisualDiscovery had no functionality and added no overhead. For example, if you visited CNN.com, a news site, VisualDiscovery had no overhead and no effect on browsing speed."

[37] Potential Superfish ships 9.1.14_3.9.15.xlsx.

[38] See Appendix B, Documents Considered, for cites to http://web.archive.org for https://shop.lenovo.com/us/en/laptops/lenovo/ .

parties that received the subject Lenovo computers; however, over 80 percent were shipped to only 15 parties, with over 55 percent shipped to one retailer, Best Buy.

31.   The starting prices shown on the Lenovo website for these products at the end of 2014 ranged from approximately $400 to $950 on the Lenovo website.[39] These are prices listed as "starting at" with actual prices depending on the individual features selected by the buyer. Exhibit 3 is a summary of selected features of the basic subject Lenovo computers.

> v.   **History of Lenovo's Decision to Discontinue Use of VisualDiscovery**

> 1.   **Security and Privacy Issues Alleged by Plaintiffs**

32.   An internal Lenovo email dated September 25, 2014 (Subject: "Update on Superfish") stated that earlier that week a "customer experienced an issue where Superfish inserted a root certificate under an HTTPS protocol transaction, causing a corporate VPN to fail, and identified the behavior as a possible…(Man-in-the-middle) attack."[40] The email went on to state that Lenovo "contacted Superfish within the hour and they started on a server side fix which disabled the insertion on any HTTPS protocol transaction. This was live within the same workday. Superfish has also provided an updated version of the shopping app that eliminates this function, which will be posted on their server and auto update the install base, this was delivered within 36 hours."

33.   Mr. Hunt described a man-in-the-middle attack as a situation in which someone intercepts traffic between a computer and a destination website and "change[s] a root certificate

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[39] See Appendix B, Documents Considered, for cites to http://web.archive.org for https://shop.lenovo.com/us/en/laptops/lenovo/ .

[40] Lenovo email from Dave Cree, 9/25/14, "Subject: Update on Superfish," Exhibit 14 to James Hunt Deposition [LEN-0018418-19].

to be something else and then represent themselves to the server as a different thing."[41] Mr. Hunt

stated that this issue related to a self-signed root certificate included in a software component in

VisualDiscovery written by a third-party (Komodia, Inc.[42]).[43]

34.   Mr. Hunt stated that Superfish disabled the potential for a man-in-the-middle

attack using the VisualDiscovery root certificate in the middle of September 2014.[44] This was

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[41] James Hunt Deposition, pp. 88-89, "Q. What is a man-in-the-middle attack? A. … in the case of an attack, someone could get in the middle and actually change that certificate to be something else and then represent themselves to the server as a different thing. Q. …an example would be that the user believes they're going to Bank of America's web site and the man in middle diverts the actual user experience to something that ostensibly looks like Bank of American but it isn't necessarily Bank of America, yes? A. Yes…. But to be clear…we know of no one that ever actually did that, we've never seen a report."

[42] http://www.komodia.com/about, accessed 8/7/16.

[43] James Hunt Deposition, pp. 184-185, "Can you elaborate on that, what was the security concern? A. Well, there was a piece of software that they got from a third party called Komodia. Komodia had a self-signed certificate. The problem with that is, is that they didn't do good engineering work when they integrated it so they simply took it, used it as-is. When they did that, they did it with the default password set that Komodia would have set just… for everybody. So anybody who had any knowledge of Komodia would know the password. Makes it easier for a hacker to get into. In addition, the design's really not robust enough because you don't want just a one-time password because that means that… you can make it as complex as you wanted, and if somebody ever cracks it, then they've cracked it for everybody. And so… its poor design, even though we've turned it off and we've taken it out, it's a reputational problem, and it's just not worth our reputation to continue to ship this so we're going to take it out and stop shipping. Q. And when did Lenovo learn that? A. I don't know the exact date, but approximately the 19th of February."

[44] James Hunt Deposition, pp. 140-141, "So they turned it off on the 23rd of September. Q. Sorry, what was turned off? A. Superfish blocked it on their server side so that they no longer were involved in https requests. They simply didn't do anything when there was an https request from the PC. Q. Okay. A. And then subsequently, Version 1.00 -- 1.0.0.5 was delivered for our winter refresh preloads on the 29th of September and it shipped supported, which means we said you can ship these systems, they're done with all the manufacturing testing, on 11/26. So we had shipped the new version at this point. You know, back -- we get back to 1/15, we decided to pull it. There were more concerns on the Lenovo forum, same date, and this is now, you know, right around that same time frame.…I don't know exactly…what started this thread….I'm just saying that…we had already released both the turned off on the server so nobody would have this issue because the server is no longer processing https requests. Secondly, we released the new code, but it had not released to the field until this November. And then sometime in this time frame, they're still talking about it, I don't know –"

confirmed by Mr. Ed Grant, a software engineer with Lenovo.[45] Superfish confirmed that

beginning on September 24, 2014, it had turned off the HTTPS functionality of the

VisualDiscovery software at its servers, and that thereafter, when VisualDiscovery detected that

a user was accessing a webpage via an HTTPS connection that VisualDiscovery did not

function.[46]

      35.   At Lenovo's request Superfish developed a version of VisualDiscovery in which

the "HTTPS functionality did not exist within the Program."[47] This version of the Program was

first delivered to the Lenovo manufacturing sites in November 2014. Lenovo learned in

February 2015 that the original version of VisualDiscovery included "a self-signed root

certificate with a private key that was stored on the device and protected only by a simple

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[45] Declaration of Ed Grant, 4/1/16, ¶ 4, p. 2, "From notes and from testing that was done by the Software Development team, beginning on September 24, 2014, Superfish, Inc. shut off the HTTPS functionality of the Program at its servers, in response to Lenovo's request. Thereafter, when the Program detected that a user was accessing a webpage via an HTTPS connection, the Program did not function."

[46] Ronen Daniel Declaration, 4/2/15, Senior Programmer at Superfish, ¶ 3, pp. 2-3, "When users of Lenovo computers containing the pre-installed software visited online shopping websites, the pre-installed software sent limited information to Superfish's servers about the web page the user was visiting and about the user's computer, for the limited purpose of identifying images of similar products for sale. The results of this visual search would then be sent back to the user and displayed in a pop-up window in the user's browser session. The information sent to Superfish's servers to perform the visual search included principally the URL of the main or first product image on the page, text associated with that product image, the name of the merchant website, the user's IP address, a unique identifier created by the pre-installed software, and certain session information." ¶ 4, p. 3, "The pre-installed software did not log users 'keystrokes, did not send Superfish users' user names, email addresses, passwords, or other personally identifiable information, nor did Superfish receive, collect, or store such information."

[47] Declaration of Ed Grant, ¶ 5, p. 2, "A subsequent version of the Program (numbered 1.0.0.5) was developed in the fall of 2014. This version was designed by Superfish, Inc. in such a way that HTTPS functionality did not exist within the Program. This version of the Program was first delivered to the Lenovo manufacturing sites to be used on Lenovo computers in November 2014."

password, but the subsequent version did not use this technique."[48] Upon learning of this root

certificate, Lenovo developed a procedure to remove the root certificate and issued a News

Release.[49]

36.   I understand that only those Lenovo computers shipped before December 1, 2014

were preinstalled with the original version of VisualDiscovery, that is, which had the self-signed

root certificate, and that those shipped after this date did not have the certificate. Exhibit X2

shows that approximately 57 percent of the total number of subject Lenovo computers were

shipped before December 2014.

37.   Mr. Hunt stated that he was not aware of any man-in-the-middle attacks on the

subject Lenovo computers,[50] and that the reported issue described in the September 25, 2014

email was not an "attack."[51]

38.   The *Complaint* also alleges violations of various statutes related to privacy

issues.[52] A representative of Superfish testified that VisualDiscovery did not log users'

keystrokes, did not send Superfish users' email addresses, user names, passwords, or other

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[48] Declaration of Ed Grant, ¶ 5, p. 2, "In late February 2015, Lenovo learned that the original version of the Program employed a self-signed root certificate with a private key that was stored on the device and protected only by a simple password, but the subsequent version did not use this technique."

[49] Updated Lenovo Statement on Superfish, 2/20/16, "In addition to the manual removal instructions currently available online, we have released an automated tool to help users remove the software and certificate. That tool is here: http://support.lenovo.com/us/en/product_security/superfish_uninstall."

[50] James Hunt Deposition, p. 122, "And it was certainly, potentially, someone could have done that. We don't know of anyone who did do that."

[51] James Hunt Deposition, pp. 88-89, "…first off, attack is a strong word. There's a potential to create an attack, but this was not an attack because it was not nefarious…. But to be clear….we know of no one that ever actually did that, we've never seen a report."

[52] *Complaint*, *e.g.*, p. 40, Count II, Violation of the Electronic Communications Privacy Act, 18 U.S.C. § 2512, and pp. 50-51, Count VIII, Violations of California's Invasion of Privacy Act, Cal. Penal Code § 630.

personally identifiable information, nor did Superfish receive, collect, or store such information.

I understand that a "user ID" used by Superfish did not identify the user's name or email address

and was comprised of a random string of numbers and characters.

39.   I understand that the Plaintiffs do no alleged that there was any theft of personal

information due to VisualDiscovery on the subject Lenovo computers, nor am I aware of any

documents or testimony in this matter documenting the theft of any personal information due to

VisualDiscovery on the subject Lenovo computers.

2.   Alleged Performance Issues

40.   An internal Lenovo email refers to a test in which decreased Internet upload and

download speeds were observed for a computer with VisualDiscovery.[53] Mr. Hunt stated that

there wasn't sufficient information about the test to determine the extent of any upload and

download speed problem, if the issue was with VisualDiscovery, or even what computer was

tested.[54] Mr. Hunt stated that he was aware of only one instance in which a customer reported an

issue with upload and download speeds of a subject Lenovo computer. I discuss below the

testimony of the Proposed Class Representatives regarding the upload and download speed of

their computers.

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[53] Lenovo email 1/9/15 to Superfish, "If you disable the service became faster 55% in the UP Load. (Faster 16.3% in the Down Load)," Exhibit 22 to James Hunt Deposition [LEN-0068738-750 at 741 to 742].

[54] James Hunt Deposition, pp. 171-172, "The problem with this type of a test is there's an incredible number of variables associated with it, and I don't know if it could be replicated two times in a row. You know, there's nothing in here about what ISP they used, what machine they were on,… there's nothing here to give you enough details to try to figure this out. This could have just simply been the machine was in the process of downloading the Windows update at the same time she ran the first test. So I can't…from this information, say absolutely this was the problem. I can say they saw that they had something they could do to improve network performance and they…provided that to us…. Q. Was there a determination that the Lenovo notebooks… that had VisualDiscovery on it from September to January…had download speed that was adversely affected by the presence of VisualDiscovery? A. I think that's a stretch. I think we had this one reported case and they did work on a fix…."

41.   Another issue raised by the Plaintiffs relates to VisualDiscovery's impact on the battery performance of the subject Lenovo computers. The *Complaint* states, "Lenovo's testing also revealed that VisualDiscovery occupied too much CPU usage, and the resulting power consumption would impact battery life. These problems were so severe that they violated the product specifications of certain Lenovo computer models."[55]

42.   ██

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██ An internal Lenovo email indicated that a test of Lenovo's Yoga 3 Pro computer showed an approximately 2 percent drop in "idle battery performance" when VisualDiscovery was installed.[59] Mr. Hunt stated that it would be misleading to say that this result would represent a 2 percent battery life reduction

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[55] *Complaint*, ¶ 79, p. 20.

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[59] Lenovo email, 10/11/14, "Subject :Yoga 3 pro Preload SW simplify discussion," We found that super fish (VirtualDiscovery) [*sic*] impacts idle battery performance for virtualDiscovery.exe [*sic*] trigs every 15.6ms. (with superfish system idle percent will drop to 95.70% from 97.61%)." Exhibit 20 of James Hunt Deposition [LEN-0056549-561 at 550].

because this test only reflects the reduction at the lowest battery state (at idle) and that additional

testing would be require to determine the impact on battery life.[60]

3.   Actions Taken by Lenovo in February/March 2015

43.   Mr. Hunt stated that Lenovo made the decision in the middle of January 2015 to

not include VisualDiscovery preloads in Lenovo computers going forward and that Lenovo

released a tool for users to remove VisualDiscovery from those computers in which the program

was installed.[61] Lenovo issued an online News Release February 19, 2015 stating that it stopped

preinstalling VisualDiscovery on computers in January, shut down the server connection that

enabled the software in January, and was providing online tools to remove VisualDiscovery from

users' computers.[62] Lenovo issued an online News Release dated February 20, 2015 giving

instructions for removal of the Superfish certificate from the subject Lenovo computers.[63]

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[60] James Hunt Deposition, p. 165, "A. With that said, it's very misleading to believe that the 95 to 97, or whatever the number was, is representative of battery life. There is not a 2 percent battery life reduction because of this. What happens is the processor goes from C5, 4, 3, 2, and 1. When it's at 1, it's at its idle. When it's at 2, it's just above idle, so even though it's just -- it's 2 percent difference in CPU utilization, it's still in a very low power state. So you can't, from this, say this is what the battery impact was. It would take additional testing."

[61] James Hunt Deposition, p. 179, "Q. Ultimately, there was a tool, right, to remove these, yes? A. I think it was released on February 19th or thereabouts."

[62] Lenovo news release, 2/19/15, http://news.lenovo.com/news-releases/lenovo-statement-on-superfish.htm. "In our effort to enhance our user experience, we pre-installed a piece of third-party software, Superfish (based in Palo Alto, CA), on some of our consumer notebooks. The goal was to improve the shopping experience using their visual discovery techniques. In reality, we had customer complaints about the software. We acted swiftly and decisively once these concerns began to be raised. We apologize for causing any concern to any users for any reason – and we are always trying to learn from experience and improve what we do and how we do it. We stopped the preloads beginning in January. We shut down the server connections that enable the software (also in January), and we are providing online resources to help users remove this software. Finally, we are working directly with Superfish and with other industry partners to ensure we address any possible security issues now and in the future. Detailed information on these activities and tools for software removal are available here…"

[63] Lenovo news release, 2/19/15, http://news.lenovo.com/news-releases/updated-lenovo-statement-on-superfish.htm.

44.   Lenovo issued an online News Release February 27, 2015, offering users with the

subject Lenovo computers "a free 6-month subscription to McAfee LiveSafe service (or a 6-

month extension for existing subscribers)."[64] At the time McAfee LiveSafe service was

approximately $80 per year per subscriber, so the value of the offer for six months was

approximately $40 per user.[65]

45.   Mr. Hunt stated that on March 21, 2015 Lenovo sent a message to Lenovo

Messenger users that determined if VisualDiscovery was on a user's computer, and if it was

present, then Lenovo provided a link to remove the program.[66] Mr. Hunt stated that as of April 1,

2015 VisualDiscovery "had been eliminated on 80% to 90% percent or more of the computers

purchased by customers preloaded with [VisualDiscovery]."

46.   Mr. Hunt stated that VisualDiscovery was removed because "there was enough

noise about security concerns that it was decided to just pull it."[67] Mr. Hunt stated that Lenovo

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[64] Lenovo news release, 2/27, 15, http://news.lenovo.com/news-releases/lenovos-promise-for-cleaner-safer-pc.htm.
[65] http://web.archive.org/web/20150128142359/http://www.staples.com/Maintenance-Security-Antivirus/cat_CL167734?pagenum=2, accessed 8/18/16.

[66] Hunt Declaration, 4/1/15, ¶ 3, pp. 1-2, "March 21, 2015, Lenovo launched a procedure to provide a direct security message to users through Lenovo Messenger. The procedure first determines if Superfish VisualDiscovery program (the 'Program'), or any of its components, are resident on the device. If so, a message will appear on the device saying 'Important Security Message from Lenovo.' Clicking on the link inside the message takes users to a Lenovo webpage entitled 'Important Security Message From Lenovo,' which gives further instructions and a download link for removal of the Program."

[67] James Hunt Deposition, p. 175, "Q. Was the determination to remove Superfish based upon a negative or a material revenue stream? A. I don't believe so. I believe it was ongoing problems. It wasn't worth the effort, plus there was enough noise about security concerns that it was decided to just pull it."

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decided to remove VisualDiscovery because of the perception of security concerns,[68] and that the

security concern related to Komodia's self-signed root certificate, which was corrected by

Superfish in September 2014.[69]

C. Proposed Class Representatives

47.   There are four Proposed Class Representatives named in the *Plaintiffs Motion for

Class Certification*, two of whom purchased their Lenovo computers directly from Lenovo

through Lenovo.com ("Direct Purchasers") and two of whom purchased their Lenovo computers

indirectly from retailers such as Ebay.com and Best Buy ("Indirect Purchasers"). Table 1 is a

summary of the four Proposed Class Representatives, the Lenovo computer models purchased,

the purchase channel, purchase date, when VisualDiscovery was removed, and the self-reported

usage between business and personal activities.

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[68] James Hunt Deposition, pp. 181-182, "Q. What did you learn between the 16th of January and the 19th of February that caused you ultimately to close the door? A. The reaction in the press was very negative. It made it sound as if this was a, you know, horrible attack that everybody was exposed to and was going to hit many machines. The reality is this attack would not hit many machines, but it was too hard to deal with the perception and it wasn't worth trying to fight the battle so we decided that it's much better to pull it because it did have a security concern, and at that point we said, Look, it's not worth trying to solve this anymore."

[69] James Hunt Deposition, pp. 184-185, "Can you elaborate on that, what was the security concern? A. Well, there was a piece of software that they got from a third party called Komodia. Komodia had a self-signed certificate. The problem with that is, is that they didn't do good engineering work when they integrated it so they simply took it, used it as-is. When they did that, they did it with the default password set that Komodia would have set just… for everybody. So anybody who had any knowledge of Komodia would know the password. Makes it easier for a hacker to get into. In addition, the design's really not robust enough because you don't want just a one-time password because that means that… you can make it as complex as you wanted, and if somebody ever cracks it, then they've cracked it for everybody. And so…we just said… it's poor design, even though we've turned it off and we've taken it out, it's a reputational problem, and it's just not worth our reputation to continue to ship this so we're going to take it out and stop shipping. Q. And when did Lenovo learn that? A. I don't know the exact date, but approximately the 19th of February."

	Ms. Jessica Bennett	**Mr. Richard Krause**	**Mr. Robert Ravencamp**	**Mr. John Whittle**
Model	Yoga 2 11	G510 Laptop	Y50-70 Laptop	G50-70 Laptop
Channel	Best Buy Store	Lenovo.com	Lenovo.com	Ebay.com (seller "All-InStock")
Purchase Date	12/26/14	12/12/14	12/7/14	Nov. 2014
VisualDiscovery Removed	Jan. 2015	Feb. 2015	Late Feb. or Early March 2015	Didn't know
Business/ Personal Use	50% Business 50% Personal (Writer)	Primarily Business Use (State Court Employee)	Personal (Retired)	85% Business 15% Personal (Tax Prep.)

Table 1 Selected Data of Proposed Class Representatives[70]

D. Plaintiffs' Allegations

48.   The Plaintiffs' allegations fall into two main categories: (a) that the presence of VisualDiscovery on the subject Lenovo computers reduced certain performance characteristics of the computers; and (b) that VisualDiscovery compromised the security and privacy of the subject Lenovo computers.

49.   Regarding the alleged performance issues, the Plaintiffs claim that VisualDiscovery increased CPU usage, increased power consumption, decreased the amount of

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[70] Core Discovery Questionnaire for Jessica Bennett, 9/8/15, and Jessica Bennett Deposition, 6/10/16, p. 25 (50/50 business/personal use), p. 27 (writer), p. 93 (removed within the month of January 2015); Core Discovery Questionnaire for Richard Krause, 9/11/15, and Richard Krause Deposition, 6/2/16, pp. 28-29 (primarily business use), p. 11 (Director of Judicial Operations, 19th Judicial Circuit of Illinois), p. 57 (removed middle to late February 2015); Core Discovery Questionnaire for Robert Ravencamp, 9/10/15, and Robert Ravencamp Deposition, 6/30/16, p. 27 (removed in late February or early March 2015), p. 201 (retired); Core Discovery Questionnaire of John Whittle, 9/4/15, and John Whittle Deposition, 6/17/16, p. 28 (tax preparation business), p. 46 (85% business/15% personal use), p. 68 (didn't know removal date).

time the affected computers could operate between charges, reduced lifespan of the batteries, and adversely affected performance in accessing the Internet.[71]

50.   Regarding the alleged security and privacy issues, the Plaintiffs claim that VisualDiscovery "broke the security connection" between a user's computer and an established website, rather that connection through a Superfish server such that a computer hacker could access information transmitted at that time.[72]

51.   The Plaintiffs claim that as a result of these alleged performance, security, and privacy issues, the Proposed Class Members suffered "actual damages and lost money or property," did not receive the benefit of their bargain, they purchased computers they otherwise would not have, and that "their computers suffered a diminution in value during the time period that VisualDiscovery was installed on them."[73]

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[71] *Complaint*, ¶ 5, p. 2, "From a performance perspective, the [VisualDiscovery software] increased CPU usage, which increased power consumption. Because all of the computers on which it was installed were laptop computers that relied on a battery, the increase CPU usage decreased both the amount of time and effective computer would operate between charges in the lifespan of the battery.… In addition, VisualDiscovery…caused certain web pages to load incorrectly and in many instances, blocked webpages entirely."

[72] *Complaint*, ¶ 6, p. 2, "From a security and privacy perspective, VisualDiscovery was a disaster. In order to operate as intended, the program, without the user's knowledge or consent, broke the security connection a user thought he or she was creating with an established website, the route in that connection through a Superfish server and then sent results back to the user in a way that had the fact that the surgeon been monitored, hijacked and altered. The process by which Superfish did all this relied on a single common digital key and weak password that were shared by all the computers and easily accessible to a computer hacker, who could use them to access an affected computer on a public network and collect whatever information is being transmitted at the time."

[73] *Complaint*, ¶ 185, p. 44.

E.   **Basis for Class Certification**

52.   I understand that the criteria for class certification are specified in F.R.C.P. Rule

23(a) and that the Plaintiffs must demonstrate: "(1) the class is so numerous that joinder of all

members is impracticable; (2) there are questions of law or fact common to the class; (3) the

claims or defenses of the representative parties are typical of the claims or defenses of the class;

and (4) the representative parties will fairly and adequately protect the interests of the class."[74] I

also understand that in this matter the Plaintiffs seek to demonstrate, under Rule 23(b)(3), that

"questions of law or fact common to class members predominate over any questions affecting

only individual members, and that a class action is superior to other available methods for fairly

and efficiently adjudicating the controversy."[75]

53.   I understand from counsel that in addition to the requirements described above the

Plaintiffs in this matter must also establish that the Proposed Class Members suffered an injury

or harm that is: concrete, particularized, and actual or imminent; tied to the alleged wrongful

acts by Lenovo, that is, inclusion of VisualDiscovery on the subject Lenovo computers; and that

damages from the alleged injury or harm be capable of measurement on a classwide basis.

IV.   **ANALYSIS AND FINDINGS**

A.   **There is Virtually No Evidence of Economic Damages Due to Alleged
        Adverse Battery Performance Issues**

54.   The *Complaint* alleges that VisualDiscovery increased CPU usage, which

increased power consumption, and that this "decreased both the amount of time an affected

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[74] Federal Rules of Civil Procedure, Rule 23(a) and see *Plaintiffs' Motion for Class Certification*, pp. 10-14.

[75] Federal Rules of Civil Procedure, Rule 23(a), and see *Plaintiffs' Motion for Class Certification*, p. 14.

computer could operate between charges and the lifespan of the battery."[76] As evidence of the

alleged adverse effects that VisualDiscovery had on the subject Lenovo computers, the

Complaint refers to an internal Lenovo email describing results of a battery test performed by

Lenovo.

55.   ███

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███████████████████████████████████████ An internal

Lenovo email cited by the Plaintiffs indicated that a test of the Yoga 3 Pro computer showed an

approximately 2 percent drop in "idle battery performance" when VisualDiscovery was

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[79] James Hunt Deposition, pp. 156-157, "A. Well, obviously, this e-mail is doing that. I -- this is from, I believe, the Yoga 3 Pro team, and the reason they would do this is, to get the best battery life, you want the processor to go to its idle state, which they have C1 through C5, and they want it to be at C1 and this… along with everything else, is not allowing the… processer to get to that state."

installed.[80] Mr. Hunt stated that it would be misleading to say that this result would be a 2

percent battery life reduction because it only reflects the reduction at the lowest battery state (at

idle) and that additional testing would be require to determine the impact of VisualDiscovery on

the battery life of the subject Lenovo computers.[81]

56.   Mr. Lee stated that, "The Yoga series laptops had some additional, unique

performance and user experience requirements. VisualDiscovery was not installed on Yoga 3

models. It was, however, installed on Yoga 2 models and passed all performance

requirements."[82]

57.   Mr. Hunt also stated that there are tens of thousands of variables that affect

battery efficiency.[83] I understand that some of these variables relate to the type of processor used

in a computer, the programs operating on a computer, and the number of accessories on a

computer (*e.g.*, speakers, additional monitors, and the screen size). In addition, the battery life

performance specifications for the subject Lenovo computers varied over 100 percent—the

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[80] Lenovo email, 10/11/14, "Subject :Yoga 3 pro Preload SW simplify discussion," We found that super fish (VirtualDiscovery) [*sic*] impacts idle battery performance for virtualDiscovery.exe [*sic*] trigs every 15.6ms. (with superfish system idle percent will drop to 95.70% from 97.61%)." Exhibit 20 of James Hunt Deposition [LEN-0056549-561 at 550].

[81] James Hunt Deposition, p. 165, "A. With that said, it's very misleading to believe that the 95 to 97, or whatever the number was, is representative of battery life. There is not a 2 percent battery life reduction because of this. What happens is the processor goes from C5, 4, 3, 2, and 1. When it's at 1, it's at its idle. When it's at 2, it's just above idle, so even though it's just -- it's 2 percent difference in CPU utilization, it's still in a very low power state. So you can't, from this, say this is what the battery impact was. It would take additional testing."

[82] Lee Declaration, ¶ 12, p. 2.

[83] James Hunt Deposition, pp. 166-167, "Everything that you do to a computer can change how the battery efficiency is. Microsoft releases an update, it may get worse, it may get better…. [I]t's a constantly moving target with literally tens of thousands of variables."

Lenovo G50-30 laptop specified a battery life "Up to 4 hours" and the Lenovo Yoga 2 Pro specified a battery life of "Up to 9 hours."[84]

58.   Dr. Malek stated that VisualDiscovery software would have had minimal effect on CPU consumption, and therefore, a minimal effect on battery consumption.[85] Dr. Malek further stated that, "Any CPU consumption by VisualDiscovery is unlikely to be perceived by the customer using the computer, and VisualDiscovery would not alone affect CPU speed to such an extent that the customer would perceive any slowness."[86]

59.   The four Proposed Class Representatives stated that they didn't consider battery life in their purchase decision and most stated that they weren't aware of a change in their computers' battery performance after VisualDiscovery was uninstalled:

- Ms. Bennett stated that she did not consider her computer's battery life[87] and that she did not notice a change in the performance of her computer's battery after VisualDiscovery was uninstalled from her computer.[88]

- Mr. Ravencamp stated that he couldn't recall information about his computer's battery life[89] and that he if he did notice any change in battery performance after

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[84] Lenovo G50-30 battery life "Up to 4 hours": http://shop.lenovo.com/us/en/laptops/lenovo/g-series/g50-70/?gclid=CP-Fkv_kjM0CFdASa#tab-tech_specs , accessed 6/3/16. Lenovo Yoga 2 Pro, battery life "Up to 9 hours": http://shop.lenovo.com/us/en/laptops/lenovo/yoga-laptop-series/yoga-laptop-2-pro/, accessed 4/8/16.

[85] Sam Malek Declaration, ¶ 47, p. 13.

[86] Sam Malek Declaration, ¶ 54, p. 14.

[87] Jessica Bennett Deposition, p. 36, "Q. What about battery life, did you consider that as part of [criteria you were considering when choosing a laptop]? A. I didn't really consider that."

[88] Jessica Bennett Deposition, p. 63, "Q. Did you notice a change in battery life? A. I did not notice a change in battery life."

VisualDiscovery was uninstalled that it was slight and that it could have been

attributable to removing other programs from his computer.[90]

- Mr. Krause stated that he wasn't certain of his computer's estimated battery life,[91]

  that his computer's battery performance didn't change after uninstalling

  VisualDiscovery,[92] and that his computer is primarily plugged in and that a

  shortened battery life wouldn't have affected him.[93]

- Mr. Whittle stated that he was unaware of any problems with the battery life on

  his computer and that he primarily used his computer when it was plugged in.[94]

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[89] Robert Ravencamp Deposition, p. 64, "Q. Did you ever see any -- well, before you bought the laptop, was there a number of hours promised or anything along those lines? A. Not that I recall."

[90] Robert Ravencamp Deposition, pp. 157-159, "Q. [H]ow much do you believe that VisualDiscovery affected the battery life on your computer?... A. I have no way of knowing that….Q…. Did you ever run tests on your battery life on your Lenovo laptop? A. No, I didn't. Q. Okay. After you removed this VisualDiscovery software, did you notice an improvement in the battery life?... A. The only way I can answer that is to say if I did, it was slight. It wasn't significant. Q. (By Mr. Lowe) Fair to say that it could have been one of the other programs you removed that increased the battery life on your computer?.... A. Your words, not mine. Q. (By Mr. Lowe) Well, is that fair to say? A. It's fair to say."

[91] Richard Krause Deposition, pp. 25-26, "Q. Did you consider battery life or battery performance when you were buying the laptop? A. Indirectly. I mean, I wouldn't want to get a computer that had a 15-minute battery life, but by the same token I don't take it for extended times where I don't have power access to it. Q. Do you know what kind of battery ended upcoming with your computer? A. No. The estimated battery life I think is a four hour, but I'm not even certain on that."

[92] Richard Krause Deposition, p. 66, "Q. Do you believe it shortened battery life of your laptop? A. I don't know. I have no reason to believe it did or didn't. Q. Okay. It wasn't your experience that you got better battery life after uninstalling Superfish?... THE WITNESS: No."

[93] Richard Krause Deposition, pp. 66-67, "Q. So your computer, your laptop is primarily used plugged in? A. Correct. Q. So a shortened battery life wouldn't really affect you? A. Under current use, no. "

[94] John Whittle Deposition, p. 96, "Q. Did you ever have any problems with the battery life on your computer? A. Not that I remember. Q. Did you primarily use it when it was plugged in or when it was on the battery? A. It was primarily plugged in."

60.   Thus, there is virtually no evidence of actual adverse battery performance issues affecting the users' experiences due the presence of VisualDiscovery on the subject Lenovo computers. Three of four Proposed Class Representatives could not attribute any decline in the performance of their computers' batteries to the presence of VisualDiscovery on their computers, and the fourth stated that the decline was slight and could have been attributable to removal of other programs on his computer. The only evidence for a decline in the battery performance is an internal Lenovo email of an approximately 2 percent decline in performance at idle on a computer that was not included among the subject Lenovo computers. Furthermore, given the numerous factors that affect a computer's battery performance, the high degree of variability in the features selected for each individual computer, the nature of the individual computer usage, and the variation in battery types among the different types of subject Lenovo computers, there is no basis to establish any common methodology to calculate damages, to the extent there were any damages, to the Proposed Class Members due to the alleged decline in battery performance from inclusion of VisualDiscovery on the subject Lenovo Computers.

B.   Evidence of Economic Damages Due to Alleged Adverse Non-Battery Performance Issues is Minimal and Not Common to Proposed Class Members

61.   The *Complaint* alleges that VisualDiscovery affected the performance of the subject Lenovo computers (in addition to the alleged adverse impacts related to increased CPU usage and decreased battery performance discussed above) in several ways including "slow[ing] internet upload speeds by as much as 55 percent and download speeds by as much as 16 percent" and "caus[ing] certain webpages to fail to load."[95]

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[95] *Complaint*, ¶ 59, p. 16.

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62.   Regarding the issue of slower Internet upload and download speeds, the Plaintiffs refer to an internal Lenovo email that describes test results showing decreased Internet upload and download speeds for computers with VisualDiscovery.[96] Mr. Hunt stated that there wasn't sufficient information about this test to determine the presence or extent of an upload and download speed problem, if the issue was with VisualDiscovery, or even what computer was tested.[97] Mr. Hunt also stated that there are "an incredible number of variables associated with" a test of upload and download speeds, such as what Internet Service Provider ("ISP") was used and what computer was tested. Dr. Malek stated, "The extent to which upload/download speeds would be affected by the VisualDiscovery software, if at all, would vary significantly based upon numerous factors…."[98]

63.   Furthermore, even if this one test applied to situations across different ISPs, computers, and content uploaded and downloaded (which is not supported by evidence in this matter), the test result does not in itself relate to a measurable impact on, or damage to, the users. Dr. Malek stated, "Any effect on upload/download speeds by VisualDiscovery is unlikely to be

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[96] Lenovo email 1/9/15 to Superfish, "If you disable the service became faster 55% in the UP Load. (Faster 16.3% in the Down Load)," Exhibit 22 to James Hunt Deposition [LEN-0068738-750 at 741 to 742].

[97] James Hunt Deposition, pp. 171-172, "The problem with this type of a test is there's an incredible number of variables associated with it, and I don't know if it could be replicated two times in a row. You know, there's nothing in here about what ISP they used, what machine they were on,… there's nothing here to give you enough details to try to figure this out. This could have just simply been the machine was in the process of downloading the Windows update at the same time she ran the first test. So I can't…from this information, say absolutely this was the problem. I can say they saw that they had something they could do to improve network performance and they…provided that to us…. Q. Was there a determination that… [a computer that] had VisualDiscovery on it from September to January…had download speed that was adversely affected by the presence of VisualDiscovery? A. I think that's a stretch. I think we had this one reported case and they did work on a fix…."

[98] "Declaration of Dr. Sam Malek in Support of Lenovo (United States), Inc.'s Opposition to Plaintiffs' Motion for Class Certification," 8/16/16 (Sam Malek Declaration), ¶ 40, p. 11. Also see ¶ 43, p. 12.

perceived by the customer using the computer. Even acting as a proxy, VisualDiscovery would

process internet traffic very quickly such that any effect on upload/download speeds would be

minimal and would not alone affect upload/download speeds to such an extent that the user

would perceive any slowness. As explained below, even if the tests cited by Dr. Rubin can be

relied upon, the results show that the effect of the VisualDiscovery program on upload/download

speeds would not have been perceived by or affected most users."[99] Dr. Malek further testified,

"Additionally, it is unlikely that any effect on upload/download speeds by VisualDiscovery

could be perceived by the customer using the computer, because even under the extreme, limited

examples cited [by the] [P]laintiffs and Dr. Rubin, the upload/download speeds well exceeded

every category of minimum speeds required by the Federal Communications Commission

("FCC").[100]

64.   Mr. Hunt stated that he was only aware of one instance of a reported customer

issue with the upload and download speeds of a subject Lenovo computer with

VisualDiscovery.[101] Perceptions of slow upload and download speeds of the subject Lenovo

computers due to the presence of VisualDiscovery does not appear to be a significant or common

issue faced by the Proposed Class Representatives.

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[99] Sam Malek Declaration, ¶ 44, p. 12.

[100] Sam Malek Declaration, ¶ 17, p. 4.

[101] James Hunt Deposition, pp. 171-172, "The problem with this type of a test is there's an incredible number of variables associated with it, and I don't know if it could be replicated two times in a row. You know, there's nothing in here about what ISP they used, what machine they were on,… there's nothing here to give you enough details to try to figure this out. This could have just simply been the machine was in the process of downloading the Windows update at the same time she ran the first test. So I can't…from this information, say absolutely this was the problem. I can say they saw that they had something they could do to improve network performance and they…provided that to us…. Q. Was there a determination that… had VisualDiscovery on it from September to January…had download speed that was adversely affected by the presence of VisualDiscovery? A. I think that's a stretch. I think we had this one reported case and they did work on a fix…."

- Ms. Bennett stated that her computer "did seem to work faster after" VisualDiscovery was deleted, but she could not quantify the difference.[102]

- Mr. Ravencamp stated that his Lenovo computer was slower than expected when he first purchased it in early December 2014;[103] however, Mr. Ravencamp also stated that even in 2016, after VisualDiscovery was uninstalled from his computer, it was slower than he expected,[104] and that the overall operating speed of his computer was faster, but not significantly so, after VisualDiscovery was removed.[105] Mr. Ravencamp did not mention any problems with speed when he submitted a review of his computer online in mid-December 2014, [106] nor did he

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[102] Jessica Bennett Deposition, p. 51, "And did you personally experience a drastic slowing of processing speeds? A. That's difficult to answer because it was a brand new laptop, and it was already preinstalled and working; so I didn't have a lot to compare it to, but I do believe that when I took the program off it did seem to work faster. Q. Is there any way you can quantify the difference in speed? A. No, I cannot. Q. And do you still believe that the program drastically slowed down your CPU? A. It seemed to me that after I took it off it ran faster."

[103] Robert Ravencamp Deposition, pp. 139-140, "Q. So from the first day you had the computer, it was slow for you? A. Yes. Slower than I expected. Q. [B]ut you didn't mention any slowness in the review you submitted for the computer online; is that correct? A. That's correct."

[104] Robert Ravencamp Deposition, p. 147, "Q. [I]f you used your laptop today, would you still have problems with upload and download speeds being slow sometimes? A. Well, it depends on what you mean by "slow." Slower than I would expect, yes. Q. Do you know why -- why is it slower than you expect? A. I don't know. Q. Okay. But this is after you removed VisualDiscovery; is that correct? A. Yeah."

[105] Robert Ravencamp Deposition, p. 152, "Did you notice a change in the speed -- we were talking about multitasking -- after you removed the VisualDiscovery software?... A. I noticed a change in the overall operating speed of the computer, yes. Q. How… did it change? A. Actually, it seemed to boot up faster. It seemed to… be able to multitask a little bit better, and… browsers opened more quickly. That kind of thing. Q. How much more quickly? A. Noticeable, but not significant. Q. Can you quantify it at all? A. I can't further than that. Q. Do you know… if this increase in speed was due to the removal of VisualDiscovery software or some other software? A. I have no way of knowing that."

[106] Exhibit D-59 to Robert Ravencamp Deposition, "I love the style and features of this laptop. The UHD screen takes a little getting used to for text as it is sometimes a little small, but the graphics are great. The backlit keyboard is very nice and the backlight is adjustable. I'm used to a MacBook keyboard & having

mention slow computer speed when he reported to Lenovo on December 30, 2014 "a flickering screen when playing videos," and an issue with the battery status indicator.[107]

- Mr. Krause stated that he thought his computer "was running a little bit faster" after VisualDiscovery was uninstalled from his computer in February 2015.[108]

- Mr. Whittle stated that he didn't know if VisualDiscovery is what caused the problems on his computer.[109] Mr. Whittle contacted Lenovo service on three occasions in the first half of 2015 and described multiple problems with his computer including "unit running really slow," and "machine is freezing and running slow and taking up 100% of the hard disk space."[110]

65.   Among the four Proposed Class Representative one stated that her computer without VisualDiscovery seemed to work faster but couldn't quantify the difference (Ms. Bennett), one stated that the overall operating speed seemed to be faster, but not significantly so

the little "nubs" on the keyboard F & J keys-would be nice on the Lenovo. Battery life is good but not great but other features of this laptop make up for it. Overall a great value for the price!" [RAVENCAMP-000015-016 at 016].

[107] Robert Ravencamp Deposition, p. 141, "Q. …And then…called Lenovo…on December 30 [2014], you didn't mention the slowness issue then either; correct? A. No, I didn't." Also see Exhibit D-65 to Robert Ravencamp Deposition, Lenovo customer service form [LEN-0 114806].

[108] Richard Krause Deposition, p. 57, "Q. So after you completed these steps, did you stop seeing pop-ups? A. That is correct. And I also noticed that it was running a little bit faster. Q…. When did you do this uninstall? A. It would have probably been in February of 2015, middle to late February."

[109] John Whittle Deposition, p. 95, "Q. Do you believe that the VisualDiscovery software caused the performance issues on your laptop? A. I am not sure if it did or not. Q. Do you think that there could have been another cause? A. I don't have the technical background. I don't know. Q. Do you believe that VisualDiscovery software affected the upload or download speeds of your Lenovo laptop? A. I don't know. Q. Did you ever run any tests regarding the upload and download speeds on your computer? A. Not that I recall. Q. Did you ever have any issues with upload and download speeds on your computer? A. I don't remember."

[110] John Whittle Deposition, pp. 81 & 87.

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(Mr. Ravencamp), one stated that his computer ran a little bit faster (Mr. Krause), and one had

his computer's hard disk drive and motherboard replaced due to multiple problems and didn't

know what caused all of his computer's problems. Thus, three of Proposed Class

Representatives stated that their computers seemed to work faster after VisualDiscovery was

uninstalled, but they could not quantify the changes, and one had multiple problems with his

computer but he could not attribute the problems to VisualDiscovery. Thus, each of the

Proposed Class Representatives had different perceptions of the changes to their computer after

VisualDiscovery was uninstalled, and none of them could quantify those changes.

66.	The *Complaint* also cites to the Plaintiffs having difficulty accessing certain

websites.[111] Mr. Hunt stated that he was aware that VisualDiscovery could interfere with a user's

ability to access online banking.[112] However, none of the Proposed Class Representatives noted

any difficulty accessing websites.

- Ms. Bennett stated that she was never blocked from accessing a website on her
  computer.[113]

- Mr. Ravencamp stated that he had no trouble accessing websites on his
  computer.[114]

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[111] *Complaint*, ¶ 5, p. 2.

[112] James Hunt Deposition, p. 123, "Q. In your review or -- and based on your experience… did the Superfish software interfere with a user's ability to do online banking? A. Yes."

[113] Jessica Bennett Deposition, p. 59, "Q. Do you know if you are ever blocked from accessing the website by VisualDiscovery? A. I don't believe that I was."

[114] Robert Ravencamp Deposition, p. 85, "Q. When… you go to the Commerce Bank website, do you need to log in in order to make these transactions we talked about? A. Absolutely. Q. Okay. Did you ever have trouble accessing the bank's website -- the Commerce Bank website -- on your laptop? A. Not that I recall."

- Mr. Krause stated that he was not aware if he was ever blocked from accessing a website on his computer.[115] Mr. Krause further stated that he wasn't aware of anything he couldn't do on his computer when VisualDiscovery was installed.[116]

- Mr. Whittle couldn't remember if he had any trouble access his banks' websites on his computer.[117]

67.   The *Complaint* also claims that users were subjected to "pop-ups" due to VisualDiscovery on their computers.[118] Ms. Bennett and Mr. Krause stated that they saw pop-up ads, but that Mr. Ravencamp and Mr. Whittle never saw pop-ups.[119] Thus, only two of the Proposed Class Representative mentioned seeing any pop-ups, but there is no indication from the Plaintiffs how frequently the pop-ups occurred (for those who saw the pop-ups), whether the pop-ups were informative or beneficial to the users, or whether the pop-ups were detrimental to the users' computer experience. VisualDiscovery used pop-ups to present shopping alternatives to users when they were on the Internet, and according to Lenovo, VisualDiscovery was

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[115] Richard Krause Deposition, p. 59, "Q. Okay. Do you know if you were ever blocked from accessing a website by Superfish? A. I do not know that. Q. You don't recall? A. I don't recall."

[116] Richard Krause Deposition, pp. 62-63, "Q. Do you feel that you were ever not able to do something on your laptop when Superfish was installed that you wanted to do? A. Do I feel like there was anything that I couldn't do? Q. Correct. A. No, I'm not aware of anything I couldn't do. Q. You were still able to surf the internet with Superfish installed? A. Correct. Q. You were still able to do online shopping with Superfish installed? A. Correct. Q. You were still able to access your online bank records and medical records with Superfish installed; is that correct? A. Yes."

[117] John Whittle Deposition, pp. 62-63, "Q. Did you ever have trouble accessing any of your banks' websites on your Lenovo laptop? A. I don't remember."

[118] *Complaint*, ¶5, p. 2.

[119] Jessica Bennett Deposition, p. 39; Robert Ravencamp Deposition, pp. 99-100; Richard Krause Deposition, p. 46; John Whittle Deposition, p. 69.

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preinstalled to "improve the user experience" and to help the "user save money" by presenting

shopping alternatives.[120]

68.   There is very limited evidence of adverse performance issues due to

VisualDiscovery affecting the users' experiences (alleged slower upload and download Internet

speeds, alleged inability to access websites, and alleged unwanted pop-ups); consequently, to the

extent that any of these alleged issues existed, there is no indication that the Proposed Class

Members sustained any measurable economic damages from these issues. Furthermore, there is

very little evidence that these alleged performance issues were commonly experienced by the

Proposed Class Representatives.

C.   There Is No Evidence that the Proposed Class Members Were Subjected to Identity Theft, Hacking, Software Viruses, or Other Security or Privacy Issues

69.   The *Complaint* alleges that the presence of VisualDiscovery and the associated

root certificate on the subject Lenovo computers created security and privacy issues for the

Proposed Class Members.[121] However, I am not aware of any instances in which a subject

Lenovo computer was hacked, subjected to the theft of users' confidential or private information,

installed with a virus, or subjected to any other security or privacy incident due to the presence of

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[120] James Hunt Deposition, pp. 27-31, p. 36, "Q. Could you describe for me what the Superfish-style experience would be so that I can then ask a follow-up question? A. Sure. The intent was that if the user was looking at something that also had a picture with it, so for example, I might have been searching for shoes. If I hovered over the picture of the shoe, it would show me the same shoe available in many different shopping locations. So it might be on Amazon, it might be on eBay, it may be on Best Buy. It might be on any number of sites. And the idea was that you could find the same shoe potentially for less money."

[121] *E.g.*, *Complaint*, ¶64, p. 17, "Stated more simply, with the private key and password, a hacker with access to someone's wireless network or a shared public wireless network, could hijack a Lenovo computer with VisualDiscovery installed on it and, without the user's knowledge, collect whatever information the user was transmitting at the time, including personal financial information, passwords or other confidential information."

VisualDiscovery. The *Complaint* alleges what "could" have happened and refers to alleged

"security risks" and "privacy" risks but does not mention any actual security or privacy incident

that occurred due to the presence of VisualDiscovery on the subject Lenovo computers.[122]

      70.   Regarding privacy issues, Dr. Malek stated that, "VisualDiscovery did not

monitor a user's computer activity, only the network traffic. It also did not monitor all of the

network traffic, rather only the network traffic from web browsers installed on a computer. It

would do so only when the user was browsing certain shopping sites."[123] Dr. Malek further

stated that, "I did not see any evidence that Superfish created profiles for users, but rather the

evidence indicates that Superfish simply used the content of the websites viewed by the users to

serve referral products….Additionally, there was no reason for Superfish to create a profile of

the user, because it did not need a user profile to function in the manner it was intended to (*i.e.*,

to determine the equivalent products that may be of interest to the user)."[124]

      71.   Regarding security issues, Dr. Malek stated that "Exploitation of [the Komodia]

certificate-related vulnerability would be a remote possibility and would require a very particular

set of circumstances to align,"[125] and that "the likelihood of an attacker having found [the

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[122] *Complaint*, *e.g.*, "security risks": ¶ 93, p. 24; ¶ 106, p. 29; ¶ 150, p. 38; ¶ 184, p. 43; ¶ 194, p. 45; ¶ 240, p. 52; "privacy risks": ¶ 194, p. 45

[123] Sam Malek Declaration, ¶ 61, p. 16.

[124] Sam Malek Declaration, ¶¶ 71-72, p. 22.

[125] Sam Malek Declaration, ¶¶ 29, p. 8.

Komodia] private key is extremely low."[126] Dr. Malek also stated that a user "who was on a

secure network was not subject to any vulnerability from the root-certificate issue."[127]

72.   None of the Proposed Class Members stated that there was any fraudulent activity

on their computers that could be attributed to VisualDiscovery.

- Ms. Bennett stated that recently (as of June 2016) there was fraudulent activity on

  her GoDaddy account, which was over a year after VisualDiscovery was

  uninstalled from her computer, but she stated that she didn't have any reason to

  believe that it was related to VisualDiscovery.[128]

- Mr. Ravencamp stated that he was notified that his email was compromised in

  April or May 2016,[129] which was over a year after VisualDiscovery was

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[126] Sam Malek Declaration, ¶ 65, p. 18.

[127] Sam Malek Declaration, ¶ 29, p. 8.

[128] Jessica Bennett Deposition, p. 65, "Q. Since you've started using your Lenovo laptop have you noticed any fraudulent activity on your financial accounts? A. Actually there was one recently. Q. When was that? A. It was last week actually. Someone hacked into my GoDaddy account and started purchasing URL addresses. Q.… What did you do to correct this issue? A. I contacted GoDaddy. I asked them to reimburse me for those, and then I changed my password and then I changed my security code.· And then they actually had an option to double security; so then I took that option as well." Pp. 66-67, "Q. Okay. Do you have any reason to believe that what happened last week was related to VisualDiscovery? A. No, I don't have any reason. Q. Have you noticed any fraudulent activities on your credit report? A. No, I have not. Q. Do you know if you've ever been hacked before you had the certificates removed? A. No, I don't believe that I was. Q. Do you know if you've had your identity stolen? A. No, I don't believe that I have."

[129] Robert Ravencamp Deposition, pp. 133-134, "Q. Do you know if anyone ever accessed your information? A. I don't know in particular. I don't know specifically whether they accessed my information, but I have a monitoring program that I've been notified that my e-mail address has been compromised. I have no reason to believe it's directly related to Superfish or Lenovo or anyone in particular, but I do -- I have been notified that my e-mail has been compromised, and it was related to an account number of a credit card that I previously had. Q.… [Y]ou were notified that your e-mail address was compromised? A. Yes. Q. When was that?... A. It was, like, two months ago [2016]."

uninstalled from his computer. Mr. Ravencamp also stated that he was not aware

of any identity theft or credit card fraud on his Lenovo computer.[130]

- Mr. Krause stated that around May 2015 he got a call from his bank (Chase)

  concerning a $10 charge, but that he didn't know if this was even related to his

  computer are not.[131] Mr. Krause stated that sometime between 2011 and 2013 his

  credit card was compromised,[132] which was before he purchased his Lenovo

  computer.

- Mr. Whittle stated that there was reported fraudulent activity on his Charles

  Schwab account in May 2015, but that he didn't know if this incident was related

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[130] Robert Ravencamp Deposition, pp. 160-162, "Q. Since you've started using your Lenovo laptop in December 2014, have you been notified of any fraudulent credit card transactions or identity theft or anything like that?... A….[I was notified that] my e-mail title and password had been compromised in relation to that number, which I believe was a credit card number. Q. Okay. Were there any fraudulent charges or anything like that? A. No…. Q. Do you recall if you used that credit card to buy items online on the Lenovo laptop? A. I don't recall. Q. Have you ever been notified by a company that your information has been the subject of a data breach? A. Yes, I have. Q. Which companies? A. United States Government, Civil Service."

[131] Richard Krause Deposition, pp. 68-69, "Q. Okay. Since you started using your Lenovo laptop, so in December 2014, have you ever noticed any fraudulent activity on your credit cards or your credit report or anything like that? A. Around May 2015 I had gotten a call from my bank asking me if a certain charge was mine. It was not, so they canceled the credit card and issued me a new one…. Q. And did you have to pay the $10 charge, or did the credit card company waive it? A. No, they forgave it. Q. Okay. Do you think that that $10 charge was somehow related to hacking or a data breach, or do you think it was a mistake by the church? A. I have no way of knowing. I have no way of knowing. Q. Fair enough. Do you attribute that in any way to the Superfish software? A. Again, I have no way of knowing."

[132] Richard Krause Deposition, pp. 69-70, "A. A couple of years ago, I don't remember if it was 2011, '12, possibly '13, my credit card was compromised, and some fraudulent activity appeared on it…. Q. Okay. Any other instances of identity theft or -- A. Not that I recall."

to VisualDiscovery.[133] Mr. Whittle stated that he is not aware that anyone ever

accessed his personal information.[134]

73.   There existed a variety of individual practices among how the Proposed Class

Representatives regarding how they handled secure websites and their personal passwords.

- Ms. Bennett stated that her computer had a password and that her home wireless

  network was password protected, but that she used her computer on other

  networks that were not password protected.[135]

- Mr. Ravencamp stated that he uses a password manager that stores all of his

  passwords and they are encrypted.[136] Mr. Ravencamp also stated that he used his

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[133] John Whittle Deposition, pp. 96-99, also see Exhibit D-35, "Q. Since you started using your Lenovo laptop in November 2014 have you been notified of any fraudulent activity on your financial accounts? A. Yes. Q. Which accounts? A. My Charles Schwab account. …. Q. Did you ever have to pay any out-of-pocket costs related to this charge of 317.49? A. No….Q. Do you know whether this 317.49 charge was related to the VisualDiscovery software? A. I don't know."

[134] John Whittle Deposition, p. 152, "Q. Do you know if anyone ever accessed your personal information? A. I don't."

[135] Jessica Bennett Deposition, p. 26, "Q. Is the wireless network at your parents' house secured? A. Yes, it is password protected. Q. And at your home? A. Yes. Q. Have you ever used your computer on a network without password protection? A. Yes, I believe so." P. 30, "Q. Did your laptop have a password on it? A. Yes, it does. Q. Has it always had a password on it? A. Yes." P. 31, "Q. How often do you change your password? A. I think I've changed it once since I got it."

[136] Robert Ravencamp Deposition, p. 89, "Q. So before then, how often did you change your passwords? A. My master passwords or my passwords to individual sites? Q. Well -- A. I have a -- I have a password manager. I'm sorry. I should have clarified that. Q. Oh. So what -- what is the password manager? A. It's called LastPass. Q. And what does it do? A. It manages passwords to the site and encrypts them in a real strong encryption. It generates secure passwords with specific designations. For instance, a certain number of characters of various types. Q. Does it store all of your passwords for websites? A. And -- and it stores all the passwords, yes. Encrypted."

computer at investor meetings and the he did not recall if the Internet connection

at those meetings required a password.[137]

- Mr. Krause stated that he does not have a password on his computer and that he

does not change his passwords for websites very often,[138] but that he did recall

using password-protected Internet sites.[139]

- Mr. Whittle stated that he couldn't remember if there was a password on his

computer,[140] but that his house wireless connection had a password.[141]

74.   I am not aware of any allegations by the Plaintiffs that VisualDiscovery increased

the vulnerability of the subject Lenovo computers to software viruses or that any of the Proposed

Class Members had a software virus on their computers as a result of VisualDiscovery. The

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[137] Robert Ravencamp Deposition, pp. 75-76, "Q. At these investor meetings, did the Internet you use require a password? A. I don't recall. Q. Okay. And then you said you used the computer at a -- maybe, at a restaurant. Do you recall what restaurant or restaurants? A. The specific -- I recall there may have been multiple restaurants….Q. [D]id you use the Internet at Bob Evans or Starbucks on your Lenovo laptop? A. I did…. Q. Do you recall if the Internet at either of those locations had passwords? A. I don't recall."

[138] Richard Krause Deposition, p. 38, "Q. And I'm curious to know if you have a password on your computer. A. I do not have a password on my computer. Q. Have you ever had a password on the Lenovo laptop? A. No, not that I recall." Pp. 38-39, "For websites that require you to log on, do you always use the same password or different passwords? A. Different passwords. Q. How often do you change your passwords for websites you log on to? A. Not very often."

[139] Richard Krause Deposition, p. 31, "Q. So every time you've used your laptop have you been connected to the internet that's password-protected? A. To the best of my knowledge, yes."

[140] John Whittle Deposition, p. 63, "Q. For the period before March 1st, 2015, did your Lenovo laptop have a password on it, the computer itself? A. To access the computer? Q. Yes. A. I don't remember."

[141] John Whittle Deposition, p. 57, "Q. Did each location you used it at have an Internet connection that required a password to get on?...A….The connection at my house did have a password to get on. Q. At your house, was that a WiFi wireless network? A. Yes, it was."

Proposed Class Representatives each stated that they had some type of anti-virus software on their computers.[142]

75.   Thus, there is no evidence that the Proposed Class Members were subjected to identify theft, hacking, software viruses, or other security or privacy issues on their Lenovo computers due the presence of VisualDiscovery.

D.   The Alleged Losses Attributed to VisualDiscovery Ranging from $0 to Over $38,0000 Are Specific to the Individual Proposed Class Representatives

76.   Two of the Proposed Class Representatives (Mr. Ravencamp and Mr. Krause) stated that they incurred no additional expenses or losses related to VisualDiscovery on their computers.[143] The alleged losses of the two other Proposed Class Representatives (Ms. Bennett and Mr. Whittle) relate to the specific uses of their computers and to the users' particular circumstance.

77.   Ms. Bennett did not state that she incurred any expenses as a result of VisualDiscovery, but she did state that her "income was affected because it prevented me [from] working for the several hours it took me to figure" out the issue and "to remove VisualDiscovery from her computer."[144] Ms. Bennett also stated that because of these activities she was a day late

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[142] Jessica Bennett Deposition, pp. 32-34 (Kaspersky); Robert Ravencamp Deposition, pp. 91-92, pp 145-146 (Kaspersky); Richard Krause Deposition, p. 17, (Malwarebytes); John Whittle Deposition, pp. 65-66 (McAfee).

[143] Robert Ravencamp Deposition, p. 193; Core Discovery Questionnaire, Richard Krause, 9/11/15, response to question #12.

[144] Jessica Bennett Deposition, pp. 69-70, "Q. Are you claiming in this litigation that having VisualDiscovery on your laptop negatively affected your income? A. Yes, I am. Q. In what way was your income affected? A. My income was affected because it prevented me for working for the several hours it took me to figure out what it was and to get it off. I think it also put me at risk because I do access my own site, my client sites. I communicate with clients; so just because it compromised the overall security of my computer and put my business at risk. Q. To your knowledge was your business website ever hacked? A. Not to my knowledge. Q. To your knowledge was your business website ever

in working on "blog posts," but that her client was not displeased with the delay and that she did not lose any clients because of these activities.

78.   It appears that Ms. Bennett was able to complete the blog posts for her client the following day and presumably bill her client when the tasks were completed. There is no indication that the time Ms. Bennett spent on researching and removing VisualDiscovery caused her not to complete an assignment for a client, not to bill for her time, or to lose income in any other way.

79.   Mr. Whittle stated that he purchased his Lenovo computer with the intent of using "TaxSlayer" software to start a tax preparation business. [145] Mr. Whittle stated that for the first year of his tax preparation business he anticipated having 200 customers and projected profits of over $38,000.[146] Mr. Whittle stated that he had approximately 10 customers (one family member and the other being friends), he never received W-2 tax statements from any of those individuals, he never prepared any tax forms for those individuals, and he never collected any revenue from those 10 individuals.[147, 148]

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damaged in any way? A. Not to my knowledge. Q. Did you lose any clients because of VisualDiscovery? A. No. Q. Did you miss any deadlines because of VisualDiscovery? A. I was not able to complete the work that I wanted to complete that day, and so my client was expecting blog posts, and I think I had to get it to her the next day; so yes. Q. Was she displeased with your lateness? A. No, she was not."

[145] John Whittle Deposition, pp. 54-55.

[146] John Whittle Deposition, See Exhibit D-39, p. 118, "Q. What was your basis for believing that you would receive 200 customers the first year? A. Part of my research was investigating how to open up a tax service and I had read a book, and that was the projection they said I could expect the first year. Q. What book was it? A. I don't remember the name. Q. Do you remember the author? A. I do not. Q. Do you remember anything about the book? A. I remember that it had instruction on how to open a tax business. Q…. Did you look anywhere else, any other sources besides the book, to help you estimate the number of customers you might receive? A. I don't remember."

[147] John Whittle Deposition, pp. 125-129, "A. It means that I never collected any revenue for the business. Q….Did JW Tax Preparation ever have any customers? A. Yes. Q. How many customers did

80.   The amount of Mr. Whittle's losses associated with this failed tax preparation business are highly speculative given that this was a new business, he had no prior experience starting a tax preparation business, he only had 10 "customers" (and those customers never gave him their tax forms), he never received money from those individuals, and there was limited basis for forecasting 200 customers his first year in business.

81.   Mr. Whittle claimed that his failure to meet the goals for his tax preparation business were due to problems with his computer; however, Mr. Whittle stated that he didn't know if VisualDiscovery is what caused the problems on his computer.[149] (Mr. Whittle contacted

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you have? A. Approximately ten. …Q. So for each one of these customers did you estimate receiving approximately $500? A. For the business ones, yes. Q. Okay. For the individual, the eight others where you said they had just regular W-2 returns, about how much did you estimate receiving from them? A. That would have been the 199….Q. How come you never collected any funds from those ten customers? A. I didn't complete the returns. Q. How come you didn't complete the returns? A. I didn't have a computer to complete them. Q. When did you receive the first of these ten customers? A. In December. Q….Do you recall when you received the other customers? A. They were within the December to February time frame. Q. So you did have your Lenovo laptop from December 2014 to February 2015, correct? A. Correct. Q. So why are you saying you didn't have a computer to complete the returns on? A. Because the W-2s aren't mailed out until the end of January, so if the people don't have the information until February and I don't have my computer then, I can't complete a return. Q. I see. So you received these customers in December of 2014 through February 2015, you didn't anticipate doing the actual returns until after you received the W-2s, which would have been I guess in February of 2015? A. Correct. Q. Did you ever start any returns for any of these individuals? A. I did not start the returns in the computer, no. Q. Did you ever start any returns in paper? A. No. Q. Did you ever start any returns on any other computers? A. No. Q. During the time period that you had your Lenovo computer, from mid-February to the end of April, did you complete any returns during that time period? A. No."

[148] John Whittle Deposition, p. 143, "Q. For the ten customers, how many of those were friends and family? A. They were a majority. They were people that I knew or people that knew somebody that I knew. Q. How many of them were family members? A. One. Q. The others you said were friends or friends of friends? A. Correct. Q. Do you think any of the ten customers you received… because of the marketing and advertising you did? A. No. Q. For the ten customers you said that you needed to wait to receive their W-2s. Did you ever receive the W-2s for those individuals? A. I did not."

[149] John Whittle Deposition, p. 95, "Q. Do you believe that the VisualDiscovery software caused the performance issues on your laptop? A. I am not sure if it did or not. Q. Do you think that there could have been another cause? A. I don't have the technical background. I don't know. Q. Do you believe that VisualDiscovery software affected the upload or download speeds of your Lenovo laptop? A. I don't know. Q. Did you ever run any tests regarding the upload and download speeds on your computer?

Lenovo on three separate occasions for multiple issues related to his computer and his computer was serviced by Lenovo in which his computer's hard disk drive and motherboard were replaced.[150]) Thus, even if Mr. Whittle's computer were somehow responsible for the losses he claims related to his failed tax preparation business, there is no indication that the presence of VisualDiscovery on the computer contributed to those losses.

82.   Thus, the magnitude of the alleged losses incurred by the Proposed Class Representatives—$0 for Mr. Ravencamp and Mr. Krause, an unknown impact on Ms. Bennett's income, and over $38,000 for Mr. Whittle—are speculative and, to the extent that there were any losses attributable to the presence of VisualDiscovery on the subject Lenovo computers, are highly dependent on the circumstances of each individual and require a case-by-case analysis to be substantiated and quantified.

E.   There Is No Evidence to Support the Plaintiff's Claims That the Presence of VisualDiscovery Diminished the Value of the Subject Lenovo Computers

83.   The Plaintiffs allege that the value of the subject Lenovo computers was diminished as a result of the installation of VisualDiscovery;[151] however, there were no reports of actual diminished value from the Proposed Class Representatives or any of the Proposed Class Members. Furthermore, even if Lenovo computers with VisualDiscovery were less valuable than Lenovo computers without VisualDiscovery, there is no evidence to indicate that the value of a Lenovo computer in which VisualDiscovery was installed and subsequently removed is any different from a Lenovo computer in which VisualDiscovery was never installed.

A. Not that I recall. Q. Did you ever have any issues with upload and download speeds on your computer? A. I don't remember."

[150] John Whittle Deposition, pp. 81 & 87.

[151] *Complaint*, ¶ 150, p. 38.

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F.   **There Is No Basis for the Plaintiffs to Assert That the Proposed Class Representatives Claims Are Typical of the Proposed Class Members Claims**

84.   Only one of the Proposed Class Representatives, Mr. Ravencamp, stated that he used his Lenovo computer primarily for personal use.[152] Ms. Bennett stated that she used her computer 50/50 for business and personal use, while Mr. Krause and Mr. Whittle each stated that they used their computers primarily for work.[153]

85.   ██ ██ ██ ████████████████████████████████████ Mr. Hunt stated that Lenovo's decision to include VisualDiscovery in the subject Lenovo computers was to improve the users' computer experience and to save the user money in shopping on the Internet.[155]

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[152] Robert Ravencamp Deposition, pp. 73-74, "Q. So what did you use the computer for? Was it business or personal use or something else? A. It was personal use…. Q….Where did you use the computer primarily? A. At home."

[153] Richard Krause Deposition, pp. 28-29, "Q. [W]hat do you use the computer for, business or personal or a mix of both? A. It would be a mix of both. Q. What would you say you primarily use it for, work or business? A. I would say work." John Whittle Deposition, p. 46, "Q. Can you estimate for me how often you used it for personal use versus business use? A. To the best of my recollection, I would say 85 percent business, 15 percent personal."

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[155] James Hunt Deposition, pp. 27-28, 31. Also see p. 36, "Q. Could you describe for me what the Superfish-style experience would be so that I can then ask a follow-up question? A. Sure. The intent was that if the user was looking at something that also had a picture with it, so for example, I might have been searching for shoes. If I hovered over the picture of the shoe, it would show me the same shoe available in many different shopping locations. So it might be on Amazon, it might be on eBay, it may be

86.   Since most of the Proposed Class Representatives use their Lenovo computers primarily for business uses while most of the purchasers of the subject Lenovo computers are expected to be individual consumers who use their computers for personal use, the basic user experiences between most of the Proposed Class Representatives and most of the expected users of the subject Lenovo computers are different. And it is because of this difference that Lenovo in large part decided to include VisualDiscovery on its consumer product line and not on its business product lines. Thus, the Proposed Class Representatives are not typical of the marketed purchasers of the subject Lenovo computers in ways that relate to the respective user experiences, and consequently, to the alleged harm to the Proposed Class Members.

V.   REBUTTTAL OF MCFARLANE DECLARATION

A.   Mr. McFarlane's "Loss in Value" Damages Methodology Is Deeply Flawed and Ignores Basic Economic Concepts of Value

87.   Mr. McFarlane's "Loss in Value" damages methodology assumes the subject Lenovo computers have a "net negative value" to the users over the period in which VisualDiscovery was installed on the computers—a period which Mr. McFarlane assumes to be five months. Mr. McFarlane then assumes a 36 month life span and a $600 purchase price to calculate a Loss in Value of $600 × (5 months/36 months) = $83.33 per computer.[156]

88.   There are multiple problems with this damages methodology. First, Mr. McFarlane simply assumes that a Lenovo computer with VisualDiscovery has a "net negative value" to a user. Mr. McFarlane states that his Loss in Value damages methodology is "based *on*

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on Best Buy. It might be on any number of sites. And the idea was that you could find the same shoe potentially for less money."

[156] McFarlane Declaration, pp. 9-12.

my understanding [*italics* added] consumers would likely not knowingly use any PC if such use resulted in the exposure to an unintended third party of all their most private and confidential information transmitted using the PC and increasing their exposure to security risks as allegedly occurred…."[157] Mr. McFarlane provides no basis for this understanding; furthermore, there is considerable evidence to the contrary from the Proposed Class Representatives who used their computers over this period, that they were not harmed and they received the benefits from the use of their computers over this period.

89.   Mr. McFarlane states, "An absence of commercial success is evidence that the product does not provide positive value."[158] This is contradicted by the facts in this case. Documents from Superfish, the developer of VisualDiscovery (and its predecessor product WindowShopper) and press articles indicate that Superfish's shopping platform had 101 million monthly users[159] and over $35 million in revenue in 2013.[160] Superfish and its shopping platform had experienced commercial success implying that it provided a service with positive value.

90.   There is no evidence of economic harm due to alleged decreased performance issues related to the presence of VisualDiscovery on the subject Lenovo computers (see discussion in Sections IV.A & IV.B); there is no evidence that the Proposed Class Members experienced identity theft, hacking, software viruses, or other security or privacy issues due to the presence of VisualDiscovery on the subject Lenovo computers (see discussion in Section

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[157] McFarlane Declaration, ¶ 23, p. 11.

[158] McFarlane Declaration, ¶ 41, p. 18.

[159] Presentation titled, "Superfish.com, WindowShopper monetization platform," copyright date 2014, p. 7.

[160] "Superfish CEO's vision for visual search has changed the way we shop, search," Silicon Valley Business Journal, 11/23/14, http://upstart.bizjournals.com/entrepreneurs/hot-shots/2014/11/23/superfish-ceo-adi-pinhas-visual-search.html?page=all, accessed 8/6/16.

IV.C); and there are no substantiated losses attributed to VisualDiscovery on the subject Lenovo computers (see discussion in Section IV.D). Mr. McFarlane's "understanding" is not supported by the experiences of the Proposed Class Representatives or any other evidence in this case.

91.   Second, since McFarlane's *assumption* that the subject Lenovo computers had a "net negative value" while installed with VisualDiscovery was unfounded and contradicted by the facts in the case, his calculation of a "Value of PC Consumed Per Month," represented in his Figure 4, is likewise unfounded. Furthermore, the basis for his "Value of PC Consumed Per Month" is an accounting concept of book value depreciation rooted in tax accounting standards, and is not based on economic principles of market prices or value to individual users.

92.   Third, even assuming there were some decline in value of computers installed with VisualDiscovery, which is not supported by the facts in this case, Mr. McFarlane's Loss in Value damages methodology contradicts basic economic principles and is deeply flawed. Mr. McFarlane assumes that the value of a computer with VisualDiscovery is $0 (or has a "net negative value") while it has full (depreciated) value without VisualDiscovery. A computer with $0 market value would imply that it could not have a positive market value in the future, that is, it has no option value.[161] In this case, using Mr. McFarlane's Loss in Value methodology, the subject computers do have value once VisualDiscovery is removed. Thus, Mr. McFarlane's Loss in Value methodology contradicts basic economic principles that a product with a positive value in the future will have a positive option value today.

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[161] An asset's option value is the value today of an asset that could have a positive value in the future. *E.g.*, see Zvi Bodie, Alex Kane, and Alan J. Marcus, *Investments*, Third Edition, Irwin, 1996, Chapter 20, p. 648. "Consider a call option that is out of the money at the moment, with the stock price below the exercise price. This does not mean the option is valueless. Even though immediate exercise today would be unprofitable, the call retains a positive value because there is always a chance the stock price will increase sufficiently by the expiration date to allow for profitable exercise. If not, the worst that can happen is that the option will expire with zero value."

B. **Mr. McFarlane's "Component Restitution" Damages Methodology Is Deeply Flawed and Ignores Basic Economic Principles of Market Supply and Demand**

93.   Mr. McFarlane's second of two damages methodologies, his "Component Restitution" damages methodology, is "based on the discount off the purchase price Lenovo would have had to offer in order to induce consumers to purchase the Affected PCs and knowingly accept the" privacy rights violations and security risks alleged by the plaintiffs,[162] and based on the "market price consumers pay to obtain additional increments of [increased] performance factors."[163]

94.   Mr. McFarlane's Component Restitution damages methodology for each of the areas of alleged performance, security, and privacy issues, examines what consumers are willing to pay for certain features, that is, this methodology examines the demand side of a market analysis. However, this methodology, as envisioned by Mr. McFarlane, ignores the supply side of the market, that is, what Lenovo would have been willing to sell the subject Lenovo computers for without the VisualDiscovery software installed.

95.   ███ ██ ███ ■ Mr. McFarlane also stated that, "Manufacturers of low-end consumer PCs compete for market share based on price. In its 2014/2015 annual report, Lenovo references price competition as one of its biggest

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[162] McFarlane Declaration, ¶ 83, p. 31 (alleged privacy rights violations) and ¶ 85, pp. 32-33 (alleged security risks).

[163] McFarlane Declaration, ¶ 88, p. 33.

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business risks it faces…"[165] Mr. McFarlane in his analysis then ignores these statements about

his characterization of Lenovo's cost and supply considerations and the market's competitive

environment and bases his Component Restitution damages analysis only on consideration of the

purchasers' buying decision.

96.   I understand that the proper measure of restitution damages is the difference in

market prices necessary to compensate a buyer for the difference between a product as

supposedly represented (*i.e.*, a Lenovo computer installed *without* VisualDiscovery) and the

product as it was received (*i.e.*, a Lenovo computer installed *with* VisualDiscovery). Thus, the

conceptual framework for Mr. McFarlane's application of his Component Restitution damages

methodology, which ignores the price that Lenovo was willing to sell its computers without

VisualDiscovery, is fundamentally flawed.

C.   Mr. McFarlane's "Component Restitution" Damages Methodology Ignores the Lack of Evidence of Harm in This Case

97.   Mr. McFarlane's Component Restitution damages methodology *assumes* that the

alleged performance, security, and privacy issues injured the Proposed Class Members. That is,

Mr. McFarlane does not present any analysis of how the Proposed Class Members were

allegedly harmed by VisualDiscovery being preinstalled on the subject Lenovo computers.

98.   My analysis shows that there is no evidence of economic harm due to alleged

decreased performance issues related to the presence of VisualDiscovery on the subject Lenovo

computers (see discussion in Sections IV.A & IV.B); there is no evidence that the Proposed

Class Members experienced identity theft, hacking, software viruses, or other security or privacy

issues due to the presence of VisualDiscovery on the subject Lenovo computers (see discussion

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[165] McFarlane Declaration, ¶ 25, p. 13.

in Section IV.C); and there are no substantiated costs or losses attributed to VisualDiscovery on

the subject Lenovo computers (see discussion in Section IV.D).

D.   Both of Mr. McFarlane's Damages Methodologies Ignore Any Mitigating Effects of Lenovo's Offer of Free Antivirus Software for Six Months

99.   Mr. McFarlane's Declaration mentions Lenovo's offer to provide a free six month

subscription for antivirus services to users of the subject Lenovo computers.[166] The typical

subscription price for McAfee antivirus software was approximately $80 a year so the value of

this additional subscription was approximately $40 per subject Lenovo computer.[167] Thus, to the

extent that any of the Proposed Class Members suffered any amount of damages as a result of the

installation of VisualDiscovery on the Lenovo computers they purchased, as claimed by the

Plaintiffs, such damages should be offset by this amount.

100.   Mr. McFarlane never considered the value of Lenovo's offer for free for antivirus

software to users of the subject Lenovo computers in offsetting any supposed damages he

calculates in this matter. Even using Mr. McFarlane's deeply flawed Loss in Value damages

methodology in which he calculates damages of $83.33 per computer, Mr. McFarlane failed to

reduce this amount by the value of Lenovo's offer of free antivirus software for six months.

E.   Mr. McFarlane's Damages Methodologies Do Not Examine if the Alleged Security and Privacy Issues Resulted in Actual Incidents or Were Only Potential Risks

101.   Mr. McFarlane refers to the "risks" of alleged security and privacy incidents on

the subject Lenovo computers. As I discuss in Section IV.C, I am not aware of any instances in

which a subject Lenovo computer was hacked, subjected to the theft of users' confidential or

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[166] McFarlane Declaration, ¶ 64, p. 26.
[167] http://web.archive.org/web/20150128142359/http://www.staples.com/Maintenance-Security-Antivirus/cat_CL167734?pagenum=2, accessed 8/18/16.

private information, installed with a virus or subjected to any other security or privacy incident

due to the presence of VisualDiscovery on the subject Lenovo computers.

F.   Both of Mr. McFarlane's Damages Methodologies Ignore the Individual Circumstances of Each Proposed Class Representative

102.   Nowhere in Mr. McFarlane's declaration is there any mention of the four

Proposed Class Representatives (Ms. Bennett, Mr. Ravencamp, Mr. Krause, or Mr. Whittle) or

their individual user experiences with the subject Lenovo computers.

103.   Mr. McFarlane never mentioned or analyzed computer use in terms of percentage

of business use versus personal use or acknowledged that three of the four Proposed Class

Representatives used their computers mainly for business use. Yet Mr. McFarlane

acknowledged in his declaration that the subject Lenovo computers were "marketed and sold

primarily to consumers" and that Lenovo did not include VisualDiscovery in computers

"marketed and sold to businesses and professionals."[168]

104.   Nowhere in Mr. McFarlane's declaration is there any mention of alleged losses

incurred by the Proposed Class Representatives, or how the presence and magnitude of those

alleged losses are highly dependent on the circumstances of each individual and require a case-

by-case analysis to be substantiated and quantified. Nor is there any discussion in Mr.

McFarlane's declaration of the variety of user experiences among the Proposed Class

Representatives related to alleged performance, security, and privacy issues.

105.   Mr. McFarlane states that his assignment was to "develop common

methodologies to reliably measure the monetary harm Class Members suffered as a result of the

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[168] McFarlane Declaration, ¶ 59, p. 24.

[*sic*] Lenovo's alleged wrongful conduct."[169] Mr. McFarlane did present common

methodologies, although flawed for the reasons I discuss above, but then ignored the

circumstances of individual users of the subject Lenovo computers and even ignored the

experiences of the Proposed Class Representatives. Thus, Mr. McFarlane's analysis is not able

to provide any insight into whether common damages issues related to the Proposed Class

Members predominate over questions affecting individual members.

> **G.   To the Extent that Mr. McFarlane Relies on a Flawed Survey Methodology
> and Misleading Survey Results, Mr. McFarlane's Damages Methodologies
> Also Would Be Flawed and Misleading**

106.   Mr. McFarlane states that both of his damages methodologies rely on the results

of a consumer survey to be undertaken by the Plaintiffs.[170] Mr. Steven P. Gaskin submitted a

declaration in this matter on July 22, 1016, in which he was asked to, "describe and design a

market research survey and analysis that would enable me to assess the reduction in value that

relevant customers assign to PC laptops, hereafter referred to as 'laptops,' that have software of

this nature."[171] Mr. McFarlane does not include a citation to the Gaskin Declaration, nor does

Mr. McFarlane reference specific details from the declaration, so I assume that Mr. McFarlane

did not review the Gaskin Declaration prior to submitting his own declaration.

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[169] McFarlane Declaration , ¶ 8, p. 5.

[170] McFarlane Declaration, ¶ 29, p. 16 and ¶ 80, p. 30, referenced under Mr. McFarlane's "Loss in Value" damages methodology; ¶¶ 83-84, pp. 31-32 referenced under Mr. McFarlane's "Component Restitution" damages methodology.

[171] Declaration of Steven P. Gaskin, 7/22/16 ("Gaskin Declaration"), ¶ 3, p. 3. Mr. Gaskin refers to VisualDiscovery software as "tailored ad software" in his proposed survey.

107.   Dr. Eugene P. Ericksen, an expert retained by Lenovo, submitted an expert report rebutting the Gaskin Declaration.[172] Dr. Ericksen states that Mr. Gaskin's proposed survey methodology, "cannot measure the reduction in value associated with tailored ad software that is vulnerable to hacking in a valid and reliable manner" for a number of reasons.[173] These include: (1) failure to present a realistic set of choices for consumers; (2) incorrect specification of the survey universe; and (3) the survey choices are presented to survey respondents in a biased and confusing manner.[174] Just to cite one example of Mr. Gaskin's flawed methodology, Dr. Ericksen finds that the description of the "tailored ad software" in Mr. Gaskin's proposed survey uses "loaded language" that does not give "any positive information about the product" and is "likely to create negative perceptions about the software."[175]

108.   To the extent that both of Mr. McFarlane's damages methodologies (*i.e.*, his "Loss in Value" damages methodology and his "Component Restitution" damages methodology) rely on a flawed survey methodology and misleading survey results, both of Mr. McFarlane's damages methodologies would be flawed and misleading.

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[172] Expert Report of Eugene P. Ericksen, 8/16/19 ("Ericksen Report").

[173] Ericksen Report, ¶ 9, p. 3.

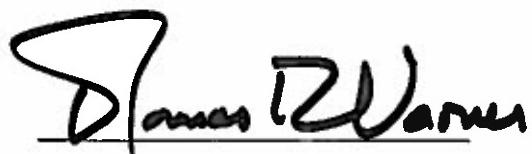[174] Ericksen Report, ¶ 10-12, p. 3.

[175] Ericksen Report, ¶ 45, p. 16.

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VI.   SIGNATURE

I declare under penalty of perjury that the forgoing is true and correct.

Executed on August 19, 2016, in Oakland, California.

Thomas R. Varner, Ph.D.

58

COMPASS LEXECON

APPENDIX A
CURRICULUM VITAE

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EDUCATION

1992 – 1997, *M.S. in Engineering-Economic Systems* and *Ph.D. in Engineering-Economic Systems & Operations Research*, Stanford University, Stanford, CA

1980 & 1987, *M.S. in Civil Engineering* and *MBA,* University of California, Berkeley, CA

1975 – 1979, *B.S. in Architecture with Honors,* California Polytechnic State University, San Luis Obispo, CA

PROFESSIONAL EXPERIENCE

January 2016 – Present, *Executive Vice President*, Compass Lexecon, Oakland, CA

April 2010 – January 2016, *Senior Vice President*, Economists Incorporated, San Francisco, CA

January 2002 – April 2010, *Principal*, Cornerstone Research, Inc., San Francisco, CA

January 2004 – March 2005, *Lecturer (Economics and Finance)*, Economics Department, University of California, Davis, CA

April 2001 – November 2001, *Manager* (Financial Advisory Services), PricewaterhouseCoopers LLP, San Francisco, CA

September 1997 – April 2001, *Managing Director*, Investment & Risk Analytics, Inc., Lafayette, CA

September 1994 – September 1997, *Consulting Researcher (Valuation of Financial Instruments)*, Prof. Darrell Duffie, Graduate School of Business, Stanford University, Palo Alto, CA

September 1993 – September 1997, *Teaching Assistant and Research Assistant*, Department of Engineering-Economic Systems, Stanford University, Stanford, CA

June 1989 – September 1993, *Engineering Manager*, Dames & Moore, San Francisco, CA

June 1980 – June 1989, *Project Manager*, Forell/Elsesser, Rutherford & Chekene and Paul F. Fratessa & Assoc., San Francisco, CA

TESTIMONY

2016: *DNA Genotek Inc., v. Spectrum Solutions L.L.C., et al.*, 3:16-cv-01544-JLS-NLS, U.S. District Court, Southern District of California. Simpson Thacher & Bartlett LLP, Palo Alto, CA. Retained by defendants as economics expert on patent infringement case involving medical devices.

2016: *In re: Lenovo Adware Litigation*, 5:15-md-02624-RMW, U.S. District Court, Northern District of California, K&L Gates LLP, Los Angeles, CA. Economics expert on behalf of defendant in consumer class action matter involving alleged consumer fraud related to computers.

2016: *Kaneka Corp. v. Zhejiang Medicine Co., Ltd., et al.*, CV 11-02389-MRP, U.S. District Court, Central District of California. Mei and Mark, LLP, Washington, DC. Retained by defendant as damages expert in patent infringement case involved pharmaceutical product.

2015-2016: *Alexander Stross v. Redfin Corp.*, 1:15-cv-223-SS, U.S. District Court, Western District of Texas. Foster Pepper PLLC, Seattle, WA. Retained by defendant as economics expert on copyright infringement case involving photographs on real estate broker website.

2015-2016: *DNA Genotek Inc., v. Ancestry.com DNA, LLC*, 15-0355-SLR, and *DNA Genotek Inc., v. Spectrum DNA*, et al., 15-cv-00661-SLR, U.S. District Court, District of Delaware. Fenwick & West, LLP, San Francisco, CA. Retained by defendant as economics expert on patent infringement case involving medical devices.

2015-2016: Confidential. Drinker Biddle & Reath LLP, Washington, DC. Expert witness services on economic analysis of copyright licensing terms.

2015-2016: Confidential. Latham & Watkins LLP, San Francisco, CA. Expert witness services on economic analysis of technology licensing terms.

2015: *Changzhou Kaidi Electrical Co, Ltd., et al.*, v. Okin America, Inc., et al., U.S. District Court, District of Maryland, 1:13-cv-1798. Mayer Brown LLP, Washington, DC. Provided expert report, deposition testimony, and testified at trial on behalf of accused infringer in patent infringement matter involving mechanical actuators.

2015: *The Cat Ball, LLC v. FurHaven Pet Products, Inc.*, U.S. District Court, Western District of Washington, 2:14-CV-00292-MJP. Foster Pepper PLLC, Seattle, CA. Damages expert on behalf of defendant in false advertising and unfair competition matter involving pet products.

2014-2015: *Matthew Burnett, et al., v. Robert Bosch LLC USA, et al.*, U.S. District Court, Middle District of Florida, 8:14-CV-01361. K&L Gates LLP, San Francisco, CA. Economics expert on behalf of defendant in class certification matter involving alleged misrepresentation of selected spark plugs.

2014-2015: *Michigan State University v. Medlen & Carroll, LLP, et al.*, U.S. District Court, Western District of Michigan, 1:14-cv-00039. Fraser Trebilcock Davis & Dunlap, P.C., Detroit, MI. Damages expert on legal malpractice mater involving alleged failure to file foreign patents related agricultural biotechnology.

2014-2015: *Isola USA Corp. v. Taiwan Union Technology Corp.*, U.S. District Court, District of Arizona, 2:12-cv-01361-SLG. K&L Gates, San Francisco, CA. Damages expert on alleged infringement of patents related to laminates for multilayer printed circuit boards.

2013-2014: *Nxegen, LLC et al. v. Sensus USA, Inc.*, U.S. District Court, District of Connecticut, 3:11-cv-01197-WGY. Mayer Brown LLP, New York, NY. Damages expert on reasonable royalties in matter involving smart meter technology for utilities.

2013-2014: *In the Matter of: Certain Crawler Cranes and Components Thereof*, U.S. International Trade Commission, No. 337-TA-887. Morris, Manning & Martin, LLP, Atlanta, GA. Expert analysis of existence of domestic market for crawler crane technology.

2013-2014: *JS Products, Inc. v. Kabo Tool Company, et al.*, U.S. District Court, District of Nevada, 2:11-cv-01856-RCJ-GWF. K&L Gates, LLP, San Francisco, CA. Damages expert in patent infringement suit involving tool industry technology.

2013: *Lodsys Group LLC v. Brother International Corp., et al.*, U.S. District Court, Eastern District of Texas, 2:11-cv-00090 (JRG). Fenwick & West, LLP, San Francisco, CA. Retained by co-defendant, Symantec Corp., as damages expert on patent infringement suit involving software technology.

2013: *Magnate International Ltd. v. Costco Wholesale Corp.*, U.S. District Court, Central District of California, 12-cv-09208-GW. Foster Pepper, PLLC, Seattle, WA. Damages expert in patent infringement suit involving pump technology.

2012-2015: *QS Wholesale, Inc. v. World Marketing Inc.*, U.S. District Court, Central District of California, 8:12-cv-00451-DOC-RNB. Covington & Burling LLP, Washington, DC. Provided expert report, deposition testimony, and testified at trial in trademark infringement suit involving trademark in apparel industry.

2012-2014: *Hart Scott Rodino IP Rulemaking*, Project No. P989316—Notice of Proposed Rulemaking Regarding Certain Licensing Transactions in Pharmaceutical Industry. Baker Botts L.L.P., Washington, DC. Submitted declaration addressing economic basis for proposed premerger notification rules related to exclusive patent licensing.

2012-2015: *TransUnion Intelligence LLC, et al. v. Search America, Inc.*, U.S. District Court, District of Minnesota, 0:11-cv-01075-PJS-LFN. Baker Hostetler, Costa Mesa, CA. Economics expert in patent infringement suit involving software technology.

2012-2013: *Light Guard Systems, Inc. v. Spot Devices, Inc.*, U.S. District Court, District of Nevada, 3:10-cv-00737-LRH-WGC. Alston & Bird LLP, Menlo Park, CA. Economics expert in patent infringement suit involving transportation technology.

2012: *Intellectual Ventures I LLC v. Check Point Software Technologies Ltd., et al.*, U.S. District Court, Delaware, 1:10-cv-01067-LPS. Durie Tangri, San Francisco, CA. Economics and damages expert in patent infringement suit involving Internet technology.

2011-2016: *Arkema Inc., et al. v. Honeywell International, Inc.*, U.S. District Court, Eastern District of Pennsylvania , 2:10-cv-02886-WY. Kirkland & Ellis LLP, Washington, DC. Economics expert in patent suit (declaratory judgment and counterclaim patent infringement suit) involving chemical product.

2009-2010: *Angela Bates, et al. v. KB Home*, Superior Court of California, County of Alameda, RG-08- 384954. K&L Gates LLP, San Francisco, CA. Provided declaration addressing the validity of sampling and statistical analysis of escrow instructions performed by plaintiffs related to class certification of a set of home buyers in California.

2009: *In re Patent of Hee Young Yun, et al.*, U.S. Patent and Trademark Office, 90/008, 143, 145, 146, and 150. McKenna Long & Aldridge LLP, Washington, DC. Provided declaration addressing economic issues related to claimed commercial success of patents for liquid crystal display (LCD) modules as part of patent reexamination process.

2007-2008: *Quantum Systems Integrators, Inc. v. Sprint Nextel Corp.*, U.S. District Court, Eastern District of Virginia, 1:07-CV-00491. Crowell & Moring LLP, Washington, DC. Provided expert report, deposition testimony, and testified at trial on economic damages arising out of alleged infringement of copyrighted software.

2007: *Alvarado Hospital Medical Center, Inc. v. Alan Wittgrove, M.D.*, Superior Court of California, County of San Diego, GIC 827726. C. Matthew Didaleusky, Esq., Oakland, CA. Provided testimony at arbitration hearing on economic damages arising out of alleged breach of contract.

2007: *SCI California Funeral Services, Inc. v. Five Bridges Foundation*, Superior Court of California, County of San Mateo, CIV 432392. Shartsis Friese LLP, San Francisco, CA. Provided deposition testimony on economic issues related to valuation of provisions in real estate agreement.

2006-2007: *DVD Copy Control Association, Inc. v. Kaleidescape, Inc.*, Superior Court of California, County of Santa Clara, 104CV031929. White & Case LLP, Palo Alto, CA. Provided deposition testimony on economic damages arising out of alleged breach of contract by licensee of proprietary DVD technology.

2005: Confidential Real Estate Co. v. Confidential Law Firm, private arbitration. Nixon Peabody LLP, San Francisco, CA. Provided expert report, deposition testimony, and testified at arbitration on economic damages related to valuation of multiple appraisals for real estate leasehold contract.

2005: *Poway RHF Housing, Inc. v. Irwin Pancake Architects, et al.*, Superior Court of California, County of Orange, 04CC09795. Hinshaw & Culbertson LLP, San Francisco, CA. Designated expert on economic damages arising out of alleged breach of contract and professional negligence against architect, and resulting in delayed opening of senior assisted living facility.

2003: *Eco-Steel Fabrication, Inc. v. Markol Iron, et al.*, Superior Court of California, County of Orange. Miller, Brown & Dannis, San Francisco, CA. Provided expert report and testified at mediation on economic damages resulting from delayed construction of luxury car dealership in southern California.

4

SELECTED MATTERS

2015: Confidential. Cravath, Swaine & Moore LLP, New York, NY. Pre-litigation consulting related economic analysis of technology licensing terms.

2011-2012: *Thermal Design, Inc. v. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.* U.S. District Court, Eastern District of Wisconsin, 07-c-0765-WEC. von Briesen & Roper, s.c., Milwaukee, WI. Economic analysis of competitive issues related to industry standards established for insulation used in non-residential, pre-engineered metal buildings.

2011-2012: *Warner Chilcott Laboratories Ireland, Ltd. et al. v. Mylan Pharmaceuticals Inc. et al.* U.S. District Court, District of New Jersey, 2:09-cv- 02073-WJM-MF. Wilson, Sonsini, Goodrich & Rosati, Palo Alto, CA. Analysis of economic issues related to the market for doxycycline hyclate delayed-release tablets and effects of proposed preliminary injunction.

2011-2012: *Abbott Laboratories et al. v. Impax Laboratories, Inc.* U.S. District Court, District of New Jersey, 210-cv-01322-DMC-JAD. Wilson, Sonsini, Goodrich & Rosati, San Diego, CA. Economic analysis of the commercial success of Abbott Laboratories' introduction and sale of TRILIPIX® (branded fenofibric acid delayed-release 45 mg and 135 mg capsules).

2011: Confidential. Hennigan Dorman LLP, Los Angeles, CA. Analyzed economic damages in patent infringement suit involving wireless communication technology.

2010: *Kenneth D. Klaas et al. v. Vestin Mortgage, Inc. et al.*, Eighth Judicial District Court In and For Clark County, State of Nevada, A528385. Gibson, Dunn & Crutcher LLP, Palo Alto, CA. Analyzed economic damages arising from merger of real estate investment funds into real estate investment trusts (REITs).

2010: *In Re: Outsidewall Tire*, U.S. District Court, Eastern District of Virginia, 1:09cv1217. Gilbert LLP, Washington, DC. Analyzed economic issues in misappropriate of trade secret, copyright infringement, and trademark infringement matter involving specialty tires.

2010: Confidential. Morgan, Lewis & Bockius LLP, Washington, DC. Retained on behalf of an international computer design firm to research and analyze Internet encryption technology license agreements.

2009-2010: Confidential, ICC International Court of Arbitration Proceeding. Morrison & Foerster LLP, San Francisco, CA. Analyzed fiduciary duties among co-investors in an Asia-based financial institution in relation to private equity industry customs and practices.

2009: *Jasmine Networks, Inc. v. Marvell Semiconductor, Inc., et al.*, Superior Court of California, County of Santa Clara, No. CV801411. Latham & Watkins LLP, San Francisco, CA. Analyzed economic damages arising out of alleged misappropriation of trade secrets, breach of fiduciary duty, and breach of contract.

2009: *Fujitsu Limited et al. v. Netgear, Inc.*, U.S. District Court, Western District of Wisconsin, 3:07-CV- 00710-BBC, O'Melveny & Myers LLP, San Francisco, CA. Provided economic and licensing analysis for patent infringement suit involving wireless Internet products.

2009: Confidential. Carmody & Torrance LLP, New Haven, CT. Retained by manufacturing company in printing industry to examine economic issues and damages arising out of patent infringement suits and antitrust counterclaims.

5

2009: Confidential. Retained by developer of risk analysis software to analyze damages arising out of alleged breach of contract involving joint development agreement.

2009: *Mosaic Systems, Inc. v. Cisco Systems, et al. & Mosaic Systems, Inc. v. Andreas Bechtolsheim, et al.*, Superior Court of California, County of Santa Clara, Nos. 104CV016867 &106CV072920. Morgan, Lewis & Bockius LLP, San Francisco, CA. Analyzed performance of board members' fiduciary duties in relation to customs and practices for board members of high-tech startup companies.

2008: Confidential. Retained by electronics firm to examine industry-wide licensing practices related to fees, royalties, and other licensing terms for discrete electronic components.

2008: *Rambus, Inc. v. Samsung Electronics Co., Ltd., et al.*, U.S. District Court, Northern District of California, No. C0502298 RMW. Munger, Tolles & Olson LLP. Analyzed economic issues related to structure of licensing terms among agreements for semiconductor technology.

2008: *Verizon Services Corp., et al. v. Cox Fibernet Virginia, Inc., et al.*, U.S. District Court, Eastern District of Virginia, No. 2:08 CV20-JBF/TEM. Kilpatrick Stockton LLP, Washington, DC. Analyzed economic damages from alleged infringement of patents related to Voice over Internet Protocol (VoIP) technology.

2008: *Beal Bank, S.S.B, et al. v. WestPoint International, Inc.*, Court of Chancery of the State of Delaware in and for New Castle County, Civil Action No. 2617- CC. Hennigan, Bennett & Dorman LLP, Los Angeles, CA. Analyzed financial and economic effects on the bondholders of a series of actions taken by defendants related to issuance of preferred shares and changes in corporate governance.

2008: *Stamps.Com Inc., vs. Endicia Inc. and PSI Systems, Inc.*, U.S. District Court Central District of California, No. CV06-07499 ABC (CTx). Sheppard Mullin Richter & Hampton LLP, Los Angeles, CA. Analyzed economic damages from alleged infringement of patents related to automated postage systems.

2007-2008: *United States ex rel. J. Richard West et al. v. Timex Corp.,* U.S. District Court, District of Connecticut, No. 3:04-CV-212 (JBA). Carmody & Torrance LLP, New Haven, CT. Analyzed price of watch products sold to U.S. Service Exchanges in alleged violation of Civil False Claims Act.

2007-2008: *Ronald A. Katz Technology Licensing LP v. General Electric Capital Corp., et al.*, U.S. District Court, Eastern District of Texas, No. 9:06-CV-197- RHC. Hennigan, Bennett & Dorman LLP, Los Angeles, CA. Analyzed economic damages from alleged infringement of patent portfolio related to interactive call processing technology.

2007-2008: North Shore City Council, Auckland, New Zealand. Consulting engagement related to economic analysis of allocation between different constituencies of construction costs for capital expansion of public transportation system.

2007-2008: *BP Chemicals Ltd. v. Jiangsu SOPO Corporation (Group) Ltd., et al.*, United States District Court, Eastern District of Missouri, No. 4:99-CV-00323 CDP. Paul, Hastings, Janofsky & Walker LLP, San Francisco, CA. Analyzed economic damages from alleged misappropriation of trade secrets related to acetic acid manufacturing technology.

2007-2009: *Lawrence J. Torango v. Aristocrat Leisure Ltd., et al.*, U.S. District Court, District of Nevada, CV-N-03-0690-HDM-VPC. McDermott Will & Emery, Palo Alto, CA. Analyzed

6

economic damages from alleged breach of contract, misappropriation of trade secrets and infringement of patent related to gaming machine technology.

2006-2007: *Asyst Technologies, Inc. v. Jenoptik AG, et al.*, U.S. District Court, Northern District of California, C98-20451 JF. Fenwick & West LLP, San Francisco, CA. Analyzed price erosion damages associated with alleged patent infringement of semiconductor manufacturing products and processes.

2006-2007: *In Re Methyl Tertiary Butyl Ether ("MTBE") Products Liability Litigation*, U.S. District Court, Southern District of New York, MDL 1358 (SAS) M21-88. Kirkland & Ellis LLP, Chicago, IL. Analyzed economic consequences to oil companies of switching from MTBE-based to Ethanol based oxygenated and reformulated gasoline over the period 1995 to 2003.

2006-2009: *MacSolutions, Inc. v. Apple Computer, Inc.*, Superior Court of California, County of Santa Clara, 1-06-CV-056547. Latham & Watkins LLP, San Francisco, CA. Analyzed economic damages related to alleged breach of contract and misappropriation of trade secrets, among other claims, between independent resellers of Apple products and Apple Computer.

2006: Fairchild Semiconductor, consulting engagement. Orrick, Herrington & Sutcliffe LLP, Menlo Park, CA. Prepared opinion letter addressing potential damage award from pending patent infringement litigation related to the acquisition of a target company by Fairchild Semiconductor.

2006: *H&R Block Eastern Enterprises, Inc., et al. v. Intuit, Inc.*, U.S. District Court, Western District of Missouri, 06-0039-CV-W-SOW. Quinn Emanuel Urquhart Oliver & Hedges, LLP, Redwood City, CA. Analyzed economic damages in original claim and subsequent counterclaim from alleged trademark infringement, false advertising, and fraudulent and negligent misrepresentations related to tax preparation software advertisements.

2006: *In the Matter of: Certain Incremental Dental Positioning Adjustment Appliances and Methods of Producing Same*, U.S. International Trade Commission, 337-TA. Paul, Hastings, Janofsky & Walker LLP, Washington, DC. Analyzed existence of domestic market for clear orthodontic products on behalf of claimant under Section 337 of Tariff Act of 1930. Claimant alleged patent infringement and trade secret misappropriation.

2006: *Jinro Industries Co., Ltd., v. Obyan Beach Resorts Associates, L.P.*, Superior Court of California, County of San Mateo, CIV436382. Calvo & Clark LLP, San Francisco, CA. Analyzed economic damages from alleged breach of contract between partners in a resort in Saipan, CNMI.

2006: *CollegeNET, Inc. v. Xap Corp.*, U.S. District Court, District of Oregon, 03- 1229-BR. Fenwick & West LLP, Mountain View, CA. Analyzed economic damages from alleged infringement of patent related to on-line college application software.

2006: *The People of the State of California v. Union Bank of California, N.A.*, *et al.*, Superior Court of California, County of Sacramento, 04AS01296. Heller Ehrman LLP, San Francisco, CA. Analyzed economic damages from alleged submittal of false unclaimed property (escheatment) reports related to municipal bonds funds.

2005: *Trust Created Under the Will of Samuel Mills Damon, Deceased*, P. No. 6664 Equity No. 2816-A. John L. McDermott (attorney for Petitioner), Honolulu, HI. Evaluated strategic alternatives and disposition of California and Hawaii real estate assets of trust.

7

2005-2006: *TiVo, Inc. v. EchoStar Communications Corp.*, *et al.*, U.S. District Court, Eastern District of Texas, 2-04cv01 (DF). Morrison & Foerster LLP, San Francisco, CA. Analyzed economic damages from alleged infringement of patent related to digital video recorders.

2005-2006: *James and Lisa Camenson, et al., v. Milgard Manufacturing, Inc.*, *et al*., Superior Court of California, County of Solano, FCS-021177. Sedgwick, Detert, Moran & Arnold LLP, and Heller Ehrman LLP, San Francisco, CA. Supported economics and marketing experts in opposition to class certification in alleged defective aluminum window litigation.

2005-2006: *LG. Philips LCD Co., Ltd. v. Tatung Co. of America, et al*., U.S. District Court, Central District of California, 02-6775 CBM LTLx. Morgan, Lewis & Bockius LLP, Philadelphia, PA. Analyzed economic damages from alleged infringement of patents related to liquid crystal display panels.

2005: Consulting assignment for Perkins Coie LLP. Performed statistical analysis of patent case terminations in U.S. District Court, Eastern District of Texas.

2004-2005: *Medtronic Vascular, Inc.*, *et al. v. Advanced Cardiovascular Systems, Inc., et al*., U.S. District Court, District of Delaware, CIV 98-80-SLR. McDermott, Will & Emery, Irvine, CA. Analyzed economic damages from alleged theft of trade secrets and infringement of patents related to cardiovascular and peripheral stents.

2004-2005: *United States v. Arnold Bengis*, *et al.*, U.S. District Court, Southern District of New York, 03 Crim. 308 (LAK). Morvillo, Abramowitz, Grand, Iason & Silberberg, P.C., New York, NY. Analyzed restitution damages to South African Government arising out of overcatches of South Coast and West Coast rock lobsters.

2004-2005: *Liveworld, Inc. v. SocialNet, Inc. and MatchNet PLC*, *et al*., Superior Court of California, County of Santa Clara. Levy, Small & Lallas, Los Angeles, CA. Performed database valuation, domain name valuation, alter ego analysis, and lost profits analysis associated with breach of contract between two Internet dating companies.

2004: *Big West Oil Company, Travel Plaza LLC, and Flying J, Inc*., *v. ConocoPhillips Company, et al.*, American Arbitration Association, 77-198- 00303-03 VSS. Gibson, Dunn & Crutcher LLP, Denver, CO. Analyzed retail diesel fuel pricing strategies of truck plaza operators for company valuation.

2004: *United States v. Intangible Property Rights in 958 Acres (Yuma Mesa Irrigation and Drainage District)*, U.S. District Court, District of Arizona, CIV- 02-0560-PHX (SRB), U.S. Department of Justice, Washington, DC. Analyzed lost revenue from the federal government's acquisition of an irrigation district's land in Arizona.

2004: *Network Caching Technology, LLC v. Novell, Inc., et al.*, U.S. District Court, Northern District of California, CV-01-2079 (VRW). Jones Day, Los Angeles, CA. Analyzed economic damages due to alleged infringement of patent related to Internet caching network technology.

2004: *Software AG, et al. v. BEA Systems, Inc*., U.S. District Court, District of Delaware. Morrison & Foerster LLP, San Francisco, CA. Analyzed economic damages due to alleged infringement of patent related to business integration software.

2003-2004: *MediaTek, Inc. v. Via Technologies, Inc*., *et al.*, U.S. District Court, Central District of California, 02-05016 DSF (RNBx). Fenwick & West LLP, Mountain View, CA. Analyzed

economic damages due to alleged patent and copyright infringement, and misappropriation of trade secrets of technology related to optical disk drives.

2003-2004: *In re Cardizem CD Antitrust Litigation*, U.S. District Court, 6th Circuit. Berman, DeValerio, Pease, Tabacco, Burt & Pucillo, San Francisco, CA. Analyzed economic damages due to alleged delayed market entry of generic pharmaceutical products.

2003: *Retail Services, Inc. and Freebie, Inc. v. Freebies Publishing, et al.*, U.S. District Court, Eastern District of Virginia, Civ. 02-1111-A. Gibson, Dunn & Crutcher LLP. Analyzed economic damages due to alleged infringement of trademark related to on-line and promotional literature.

2003: *MEIE Syndicate Analysis*, Australia Taxation Office and Owens Dixon, Sydney, NSW, Australia. Analyzed economic basis for series of licensing and funding agreements between investors of distributed multimedia computing technology.

2003: *In re Timex Industries, Inc., et al.* U.S. Bankruptcy Court, Central District of California, 03- 16833-MJ, Chapter 11 Proceeding. Levy, Small & Lallas (attorney for creditor), Los Angeles, CA. Analyzed financial viability of building products company in bankruptcy proceeding.

2003: *Dan Gill, et al. v. ExxonMobil Corporation, Inc., et al.*, County Court 4 of Nueces County Texas, 03-60079-4. ExxonMobil in-house counsel, Houston, TX. Analyzed wholesale, DTT, and retail gasoline prices in selected Texas cities in response to alleged breach of contract regarding dealer price rebates.

2003: *Sun Life Assurance Company of Canada v. Golden Eagle Insurance Corporation, et al.*, Private arbitration. Milbank, Tweed, Hadley & McCoy LLP, Los Angeles, CA. Analyzed statistical sampling methodology employed in review of reinsurance treaties associated with a portfolio of Workers' Compensation insurance claims.

2002-2003: *Lawrence J. Knapp and Nicer Technologies, L.P. v. Raymond M. Galas so and Thompson & Knight LLP*, District Court of Tarrant County, Texas, 153-191270-02. Shannon, Grace, Ratliff & Miller LLP, Fort Worth, TX. Analyzed economic damages due to alleged negligence in prosecution of a patent related to testing equipment used to calibrate semiconductor manufacturing devices.

2002: *Macpherson's Inc., et al. v. Windermere Real Estate Services Company, et al.*, U.S. District Court, Western District of Washington, C01-1885P. Demco Law Firm, P.S., Seattle, WA. Assessed validity of plaintiffs' antitrust claims against a franchisor of residential real estate brokerage businesses.

2002: *Raman Froze d.b.a. Wizen Software v. EarthLink Network, Inc., et al.*, Superior Court of the State of California, City and County of San Francisco, 11889-01. Quinn, Emanuel, Urquhart, Oliver & Hedges, LLP, San Francisco, CA. Analyzed economic damages due to alleged breach of contract and misappropriation of software programming code.

2001-2002: *Business Objects, S.A. v. Congas, Inc., et al.*, U.S. District Court, Northern District of California, C 20503. Fenwick & West LLP, Mountain View, CA. Analyzed economic damages due to alleged infringement of patent related to relational database software.

PUBLICATIONS

Varner, Thomas R., "Federal Circuit Again Scrutinizes Reasonable Royalties in Patent Damages in *VirnetX v. Cisco Systems and Apple*," *The Economists Ink*, Winter 2015.

Varner, Thomas R., "Nash Bargaining May Not Be Right for Patent Damages," *Law360*, April 18, 2014.

Varner, Thomas R., "Empirical Data on 'Comparable Licenses' in Patent Infringement Suits," *The Economists Ink*, Fall 2012.

Varner, Thomas R., "An Economic Perspective on Patent Licensing Structure and Provisions," *Business Economics*, Vol. 46 (4), October 2011.

Varner, Thomas R., "*Uniloc* and the Demise of the 25 Percent Rule," *The Economists Ink*, Spring 2011.

Varner, Thomas R., "Technology Royalty Rates in SEC Filings," *les Nouvelles*, Journal of the Licensing Executives Society International, Vol. XLV, No. 3, September 2010, pp. 120-127.

Varner, Thomas R., "Reasonable Royalties and 'Comparable Licenses': Three Recent Court Rulings," *The Economists Ink*, Spring 2010.

PROFESSIONAL AFFILIATIONS

Member, Licensing Executives Society, USA & Canada

Member, American Economics Association

Member, National Association of Business Economists

Member, American Society of Civil Engineers

Associate Member, American Bar Association (Litigation Section, Real Property Section and Construction Industry Forum)

OTHER

Speaker on economics, damages and technology licensing issues at Licensing Executives Society (LES), American Law Institute/American Bar Association (ALI/ABA) and Law Seminars International (LSI) seminars and conferences.

Licensed Civil Engineer and Licensed Structural Engineer (Inactive), State of California

Certificate in Hazardous Materials Management, University of California, Davis, 1990

Ph.D. Dissertation: *Strategic Investment Analysis: A Study of Indirect Effects in Optimal Portfolio Selection*, 1997

Appendix B

Documents Considered

Depositions

Deposition with Exhibits of Jessica Bennett, June 10, 2016

Deposition with Exhibits of Robert Ravencamp, June 30, 2016

Deposition with Exhibits of Richard Krause, June 2, 2016

Deposition with Exhibits of John Whittle, June 17, 2016

Deposition with Exhibits of James Hunt, June 22, 2016

Case Filings

Stipulation and [Proposed] Case Management Order No. 3, February 19, 2016

Order Following Case Management Conference and Setting Case Schedule, September 1, 2015

Stipulation and [Proposed] Case Management Order No. 2, November 10, 2015

Defendant Lenovo's Responses to Plaintiff's First Set of Requests for Production of Documents, February 5, 2016

Plaintiffs' Consolidated Responses to Defendant Lenovo, Inc.'s First Set of Requests for Production of Documents, March 10, 2016

Plaintiffs' Consolidated Responses to Defendant Lenovo, Inc.'s First Set of Interrogatories, March 10, 2016

Declaration of Ronen Daniel, April 3, 2015

Declaration of Ed Grant, April 3, 2015

Declaration of Jim Hunt, April 3, 2015

Core Discovery Questionnaire of Named Plaintiff Jessica N. Bennett, September 8, 2015

Verification of Interrogatory Answers – Jessica Bennett, March 9, 2016

Core Discovery Questionnaire of Named Plaintiff Rhonda Estrella, September 3, 2015

Verification of Interrogatory Answers – Rhonda Estrella, March 17, 2016

Core Discovery Questionnaire of Named Plaintiff Richard A. Krause, September 11, 2015

Verification of Interrogatory Answers – Richard Krause, March 9, 2016

Core Discovery Questionnaire of Named Plaintiff Robert Ravencamp, September 10, 2015

Verification of Interrogatory Answers – Robert Ravencamp, March 9, 2016

Core Discovery Questionnaire of Named Plaintiff John Whittle, September 4, 2015

Verification of Interrogatory Answers – John Whittle, March 11, 2016

Stipulated Protective Order for Litigation Involving Patents, highly Sensitive Confidential Information and/or Trade Secrets, August 25, 2015

Consolidated Class Action Complaint and Demand for Jury Trial, November 12, 2015

Expert Declaration and Exhibits of Bruce McFarlane, July 22, 2016

Declaration and Exhibits of Steven P. Gaskin, July 22, 2016

Plaintiffs' Motion for Class Certification, July 22, 2016

Expert Declaration and Exhibits of Dr. Aviel D. Rubin, July 22, 2016

Declaration of Feng Lee, August 15, 2016

Expert Report of Eugene P. Ericksen, August 16, 2016

Declaration of Dr. Sam Malek in Support of Lenovo (United States), Inc.'s Opposition to Plaintiffs' Motion for Class Certification, August 16, 2016

Case Documents with Bates Numbers

SF_MDL_006937 – Superfish User and Usage data, February 23, 2015

SF_MDL_009521 – Komodia Options and Financial data, May 14, 2014

LEN-0052348 – Superfish Initial Shipment plan, August 15, 2014

SF_MDL 011555 – Schedule for Komodia Installs, December 22, 2014

SF_MDL_011554 – Email with description and explanation of Komodia Installs data, December 22, 2014

LEN-0037190 – "RE Superfish Monthly Report.msg" with attachment showing clicks and revenue in the month of September 2014, October 17, 2014

LEN-0094966 – LEN-0094971 – Lenovo Presentation titled "Remediation Metrics Review," June 29, 2015

LEN-0049998 – LEN-0050000 - Confidentiality Agreement between Superfish and Lenovo

LEN-0043960 – LEN-0043963 – Email chain titled "Superfish and Lenovo RE: follow up on UX Review," April 14 2014

LEN-0043777 – LEN-0043779 - Email chain titled "Superfish and Lenovo RE: follow up on UX Review," April 20 2014

EVER121922.000001 - EVER121922.000003 – Email chain discussing upload and download speeds

SF_MDL_000029 – SF_MDL_000030 – Superfish Privacy Policy, April 10, 2015

SF_MDL_000031 – SF_MDL_000035 – Superfish Terms of Use, April 10, 2015

LEN-0050036 – LEN-0050055 – "Business License Agreement" between Lenovo and Superfish

LEN-0037401 – LEN-0037403 – Email chain titled "Re: Super Urgent – Customer Complaint on Superfish," September 24, 2014

LEN-0010191 – LEN-0010193 – Email chain titled "RE: Discuss with LBG RD and Quality team for superfish's solution and next step plan," September 25, 2014

LEN-0037191 – LEN-0037192 - Email chain titled "RE: preloaded Superfish Visual Discovery," September 26, 2014

LEN-0056397 – Email chain titled "RE: Please answer some question from qu[a]lity team," September 25, 2014

LEN-0037517 – LEN-0037519 – Email chain titled "Re: Super Urgent – Customer Complain on Superfish," September 23, 2014

LEN-0037418 – LEN-0037422 – Email chain titled "FW: Hot… FW: preloaded Superfish Visual Discover," September 23, 2014

LEN-0009080 – LEN-0009081 – Email chain titled "RE: Super Urgent – Customer Complain on Superfish," September 23, 2014

LEN-0037203 – LEN-0037208 – Email chain titled "RE: Adware Program preloaded in Yoga 2 Pro?," November 5, 2014

LEN-0056499 – Lenovo presentation titled "FuPan – Superfish Issue in Https Protocol Websites," October 9, 2014

LEN-0044217 – LEN-0044259 – Lenovo presentation titled "LBG Holiday Refresh Preload Proposal," April 9, 2014

LEN-0044475 – LEN-0044482 – Presentation by Superfish.com titled "WindowShopper monetization platform"

LEN-0048477 – "Superfish Overview"

LEN-0049404 – LEN-0049406 – Document titled "Superfish Visual Discovery"

LEN-0004080 – LEN0004081 – Document titled "Superfish Visual Search"

LEN-0058496 – LEN-0058503 – Presentation titled "Superfish," September 24, 2014

LEN-0069234 – LEN-0069243 – Superfish presentation titled "Lenovo See-More UX Walkthrough"

BENNETT-000001 – BENNETT-000107 – Named plaintiff information

ESTRELLA-000001 – ESTRELLA-000006 – Named plaintiff information

KRAUSE-000001 – KRAUSE-000007 – Named plaintiff information

RAVENCAMP-000001 – RAVENCAMP-000021 - Named plaintiff information

WHITTLE-000001 – WHITTLE-000047 – Named plaintiff information

CONFIDENTIAL

SF_MDL_005770 – SF_MDL_005775 – Email chain titled "RE: Removal of Superfish," January 18, 2015

SF_MDL_005809 – Email titled "Lenovo status," January 21, 2015

SF_MDL_012368 – SF_MDL_012370 – Email chain titled "RE: DFJ Marketing wants to Talk" discussing remote possibility of hacking, February 19, 2015

SF_MDL_012426 – SF_MDL_012427 – Email chain titled "Lenovo news today" discussing Superfish articles and potential threat, February 19, 2015

SF_MDL_012490 – SF_MDL_012492 – Email chain discussing potential cyber-attack, February 20, 2015

SF_MDL_007173 – SF_MDL_007177 – Email chain titled "RE: Daily number Lenovo users calling Superfish," February 26, 2015

SF_MDL_003924 – Email containing technical description of https blocking, October 14, 2014

LEN-0045974 – LEN-0045981 – Email chain discussing potential upload and download speed issues, January 14, 2015

LENSUP-0006121 – Email titled "RE: [Urgent] User can not open IE when they use web bank on the machine with Superfish," December 25, 2014

LENSUP-0048230 – Email titled "Superfish build" concerning increased CPU usage with VisualDiscovery, May 13, 2014

LENSUP-0066389 – LEN-0066391 – Email chain concerning CPU usage of VisualDiscovery, June 26, 2014

LENSUP-0053527 – Email discussing CPU usage of VisualDiscovery, June 26, 2014

LENSUP-0053947 – LENSUP-0053948 – Email discussing CPU usage and battery life when running VisualDiscovery, June 27, 2014

LENSUP-0066381 – Email discussing battery consumption when running VisualDiscovery, July 22, 2014

LENSUP-0055896 – LENSUP-0055897 – Email chain titled "RE: Superfish power consumption problem on Yoga 3," July 29, 2014

LENSUP-0018041 – LENSUP0018045 – Email chain titled "RE: Superfish comsumption [sic] issue on Yoga3 11 & Yoga3 14," October 15, 2014

LENSUP-0056755 – Email chain titled "RE: Yoga 3 pro Preload SW simplify discussion," October 17, 2014

LENSUP-0061876 – LENSUP-0061877 – Email discussing preload of Superfish on Yoga models, January 7, 2015

LENSUP-0006125 – LENSUP-0006126 – Email chain titled "RE: [Urgent] User can not open IE when they use web bank on the machine with Superfish," December 24, 2014

SF_MDL_005777 – SF_MDL_005779 – Email containing Superfish click numbers, January 19, 2015

SF_MDL_013041 – SF_MDL_013050 – Email titled "Lenovo installs" showing number of opt-outs from welcome pop-up, February 21, 2015

Other (Online resources and non-numbered documents)

Best Buy Return & Exchange Policy, http://www.bestbuy.com/site/help-topics/return-exchange-policy/pcmcat260800050014.c?id=pcmcat260800050014, accessed January 28, 2016

"Lenovo Limited Warranty," https://download.lenovo.com/ibmdl/pub/pc/pccbbs/thinkcentre_pdf/l505-0010-02_en.pdf, accessed August 10, 2016

"Broadband Speed Guide," Federal Communications Commission, https://www.fcc.gov/reports-research/guides/broadband-speed-guide, accessed July 29, 2016

Civil Minutes – General in proceeding of "Order Denying Plaintiffs' Amended Motion for Class Certification" In re NJOY, Inc. Consumer Class Action Litigation, February 2, 2016

Order Denying Plaintiffs' Amended Motion for Class Certification for In re NJOY, Inc. Consumer Class Action Litigation, August 14, 2015

Lenovo License Agreement, October 2013, https://download.lenovo.com/pccbbs/thinkcentre_pdf/l505-0009-05-eng.pdf, accessed August 10, 2016

Lenovo Order – Click Agreement

Lenovo Sales Agreement, September 2013

Lenovo Warranty Services Agreement

Perlroth, Nicole "How Superfish's Security-Compromising Adware Came to Inhabit Lenovo's PCs," *The New York Times*, March 1, 2015, http://www.nytimes.com/2015/03/02/technology/how-superfishs-security-compromising-adware-came-to-inhabit-lenovos-pcs.html?_r=0, accessed August 10, 2016

Graham, Robert, "Extracting the SuperFish Certificate," February 19, 2015, http://blog.erratasec.com/2015/02/extracting-superfish-certificate.html, accessed December 2, 2015

Hasleton, Todd, "Lenovo responds to 'Superfish' report, says malware is no longer active," February 19, 2015, http://www.technobuffalo.com/2015/02/19/lenovo-responds-to-superfish-report-says-malware-is-no-longer-active/, accessed December 2, 2015

Perlroth, Nicole "Lenovo and Superfish Penetrate the Heart of a Computer's Security," *The New York Times*, February 22, 2015, http://bits.blogs.nytimes.com/2015/02/22/lenovo-and-superfish-penetrate-the-heart-of-a-computers-security/, accessed December 2, 2015

Discussion on Lenovo Forums titled, "Potentially Unwanted Program – Superfish VisualDiscovery," https://forums.lenovo.com/t5/Security-Malware/Potentially-Unwanted-Program-Superfish-VisualDiscovery/td-p/1794457, accessed December 2, 2015

Hern, Alex, "Dell ships computers with built-in security flaw," The Guardian, November 24, 2015, https://www.theguardian.com/technology/2015/nov/24/dell-security-flaw-apologises-for-shipping-computers, accessed December 2, 2015

Symantec Norton Removal Summary, https://www.symantec.com/security_response/writeup.jsp?docid=2015-022009-1243-99, accessed March 24, 2015

Lenovo Forum Post describing Free McAfee Subscription Offer, March 9, 2015,

https://forums.lenovo.com/t5/Lenovo-P-Y-and-Z-series/Lenovo-Pre-instaling-adware-spam-Superfish-powerd-by/td-p/1726839/page/16, accessed August 10, 2016

Lenovo Forum Post describing temporary removal of Superfish, January 23, 2015, https://forums.lenovo.com/t5/Lenovo-P-Y-and-Z-series/Lenovo-Pre-instaling-adware-spam-Superfish-powerd-by/td-p/1726839/page/3, accessed August 10, 2016

Important Security Message from Lenovo - Lenovo Support (US)

"Information on Free Mcafee Subscription for Lenovo Computers with Superfish Preload," http://support.lenovo.com/us/en/mcafeesubscription, accessed March 13, 2015

Lenovo security advisory re: Superfish, http://support.lenovo.com/us/en/product_security/superfish, accessed March 13, 2015

"Lenovo Statement on SuperFish," February 19, 2015, http://news.lenovo.com/news-releases/lenovo-statement-on-superfish.htm, accessed August 10, 2016

Lenovo Superfish removal source code, https://github.com/lenovo-inc/superfishremoval/, accessed March 13, 2015

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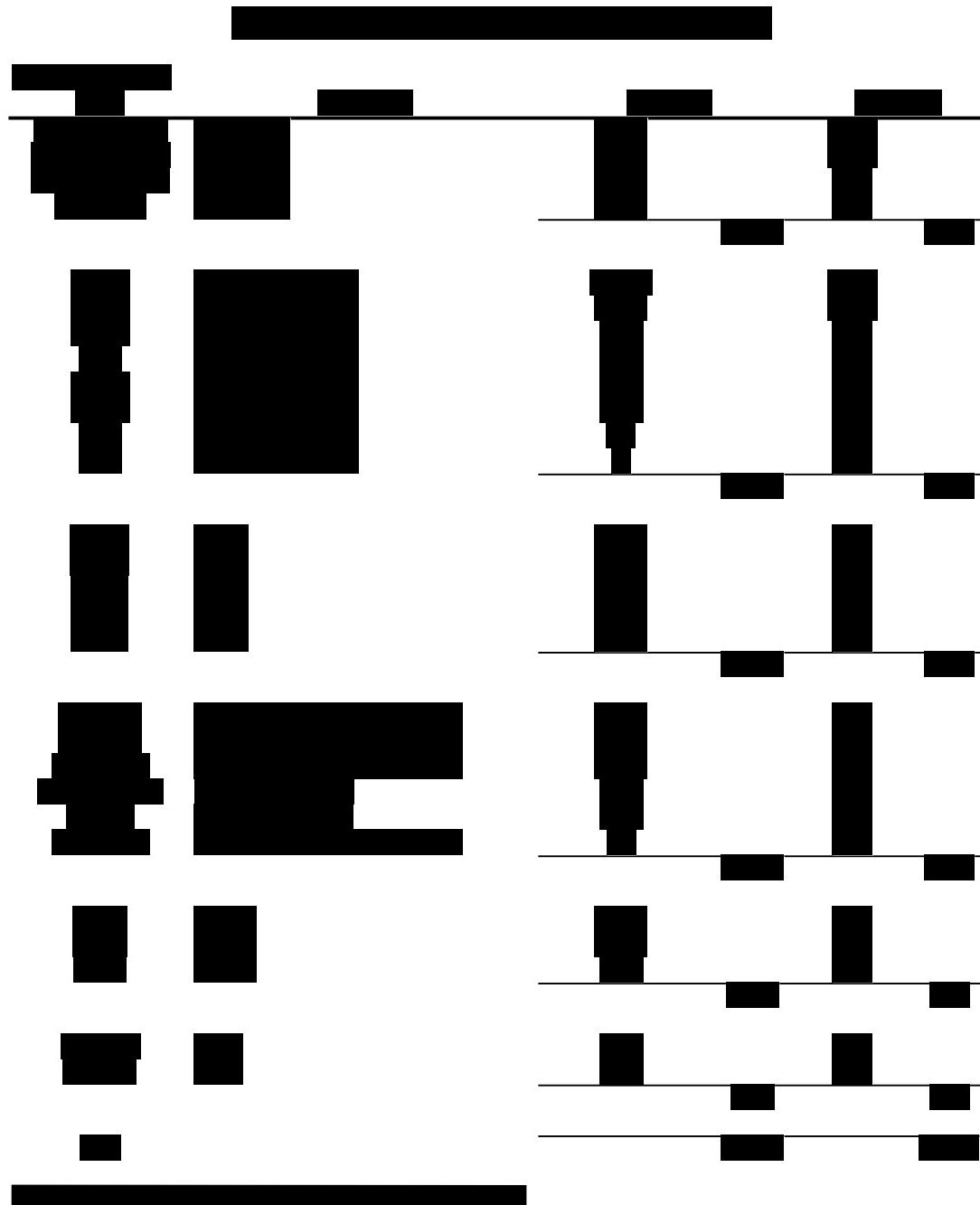
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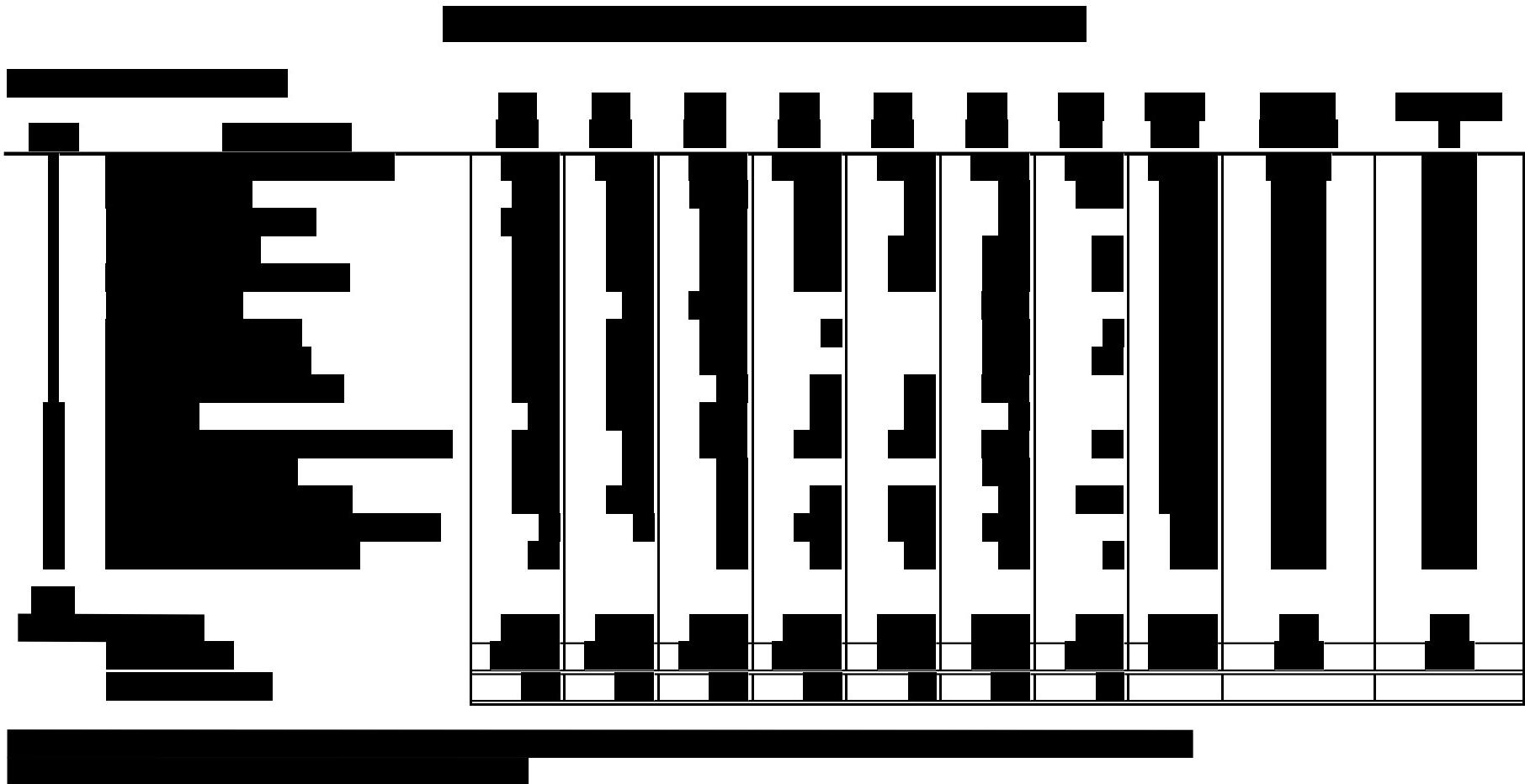
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See declaration footnotes for additional documents not referenced above.

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Exhibit 3 Lenovo Computers, Selected Feature Specifications

Feature	Lenovo Computer						
	FLEX 2 (15 INCH)	G50-30	Y40-80	Y50	YOGA 2 (11-INCH)	enovo Yoga 2 Pro Spec	LENOVO Z50
Processor	4th Generation Intel Core i5-4210U Processor	IntelR CeleronR Processor N2830 (2.16 GHz 1600MHz 1MB)	Up to 5th Generation Intel Core i7 Processor	Up to 4th Gen Intel Core i7-4720HQ Processor (2.60GHz 1600MHz 6MB)	Up to Intel Quad Core Pentium N3520 processor	4th Gen Intel Core i7-4510U (2.00GHz 1600 MHz 4MB); 4th Gen Intel Core™ i7-4500U (1.80GHz 1600MHz 4MB); 4th Gen Intel Core i5-4210U (1.70GHz 1600MHz 3MB)	4th Gen Intel Core i7-4510U (2.00GHz 1600MHz 4MB)
Operating System	Windows 8.1 64	Windows 8.1 with Bing	Windows 8.1 64	Up to Windows 10 Home 64	Up to Windows 8.1	Windows 8.1 64	Windows 8.1 64
Graphics	Integrated Intel HD Graphics 4400	Intel HD Graphics	AMD Radeon R9 M275 2GB	NVIDIA GeForce GTX 960M 2GB/4GB	Integrated Intel HD graphics	Integrated Intel HD Graphics 4400	Intel HD Graphics 4400
Memory	Up to 6.0 GB PC3-12800 DDR3 SDRAM 1600 MHz	2GB PC3-10600 DDR3L SDRAM 1333 MHz	8.0 GB PC3L-12800 DDR3L	8.0 GB PC3L-12800 DDR3L SDRAM 1600 MHz	Up to 4 GB DDR3L (on board)	Up to 8 GB DDR3L 1600 MHz, on-board two-channel (4GB/8GB)	Up to 8 GB PC3-12800 DDR3L SDRAM 1600 MHz
Integrated Communications	Lenovo BGN Wireless; Intel Dual Band Wireless-AC 3160; Bluetooth 4.0	Bluetooth 4.0, 802.11 b/g/n	Bluetooth Version 4.0	Bluetooth 4.0; Intel Dual Band Wireless-AC 3160	Bluetooth® Integrated Bluetooth® 4.0 and 802.11 b/g/n WiFi connectivity	Intel Wireless-N 7260 802.11 b/g/n; Bluetooth 4.0; microphone); micro HDMI-out;	Bluetooth 4.0; Intel Dual Band Wireless-AC 3160; WiFi; 10/100/1000M LAN
Battery	Up to 6 hours with standard 4-cell battery (48 wh)	Up to 4 hours	Up to 5 hours WiFi browsing depending on configuration	Up to 5 hours WiFi browsing depending on configuration	Up to 34 Wh; 6 hours web browsing @150 Nits; 6 hours HD playback @150 Nits	Up to 9 hrs Windows 8 Idle @ 150 nits	Up to 5 hours
Display/Resolution	15.6" HD 10-point multitouch display (1366x768); 16:9 widescreen	15.6" HD (1366 x 768) display	14" FHD (1920 x 1080) Display	15.6" FHD (1920 x 1080) display	11.6" (1366 x 768) HD IPS display with 10-point multitouch and 178o wide-viewing angle	13.3" high-resolution QHD+ (3200 x 1800); PS wide-view display with 10-point multitouch technology	15.6" FHD (1920 x 1080); 16:9 widescreen
Storage	1TB 5400 RPM	320GB (5400 RPM)	1TB 5400 rpm	Hard Drive Up to 1TB Hybrid SSHD with integrated 8 GB NAND flash or up to 512GB SSD	Up to 500GB HDD storage or up to 500GB Hybrid SSHD storage with integrated SSD cache	Up to 512GB (SSD)	500GB (5400 RPM)
Multimedia	YouCam; Amazon Kindle	CyberLink YouCam			YouCam; Skype; Amazon Kindle; Zinio Magazine Reader		
Productivity	Microsoft Office 2013 Trial; Evernote	Microsoft Office 365 Home Premium 30-day trial; Lenovo Cloud Storage; Evernote			Productivity ◦ Office 2013; Lenovo Cloud Storage; Evernote; Nitro Pro	Microsoft Office 365 Home Premium 30-day trial; Lenovo Cloud Storage; CyberLink YouCam	